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# amateur radio action

Oceania's Amateur Magazine

Volume 15 Number 7

\$3.50\*

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# amateur radio action

Volume 15, Number 7

On Sale: 27 October, 1992

## Special Features

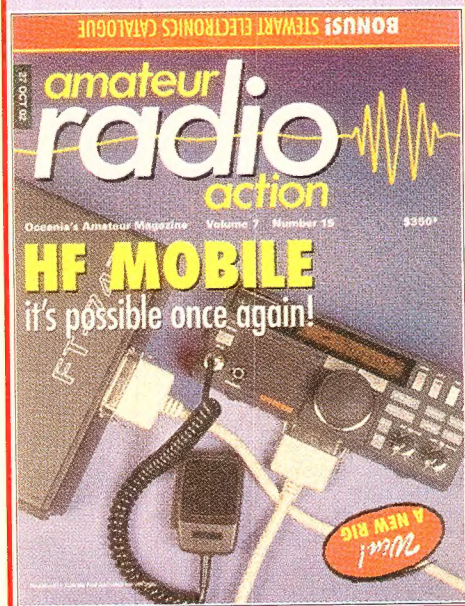
- 12 REMOTE CONTROL FOR THE YAESU FT-747:** How many of you would consider putting an HF rig in your car — if only you could find one which would *fit*? Today's cars are simply too cluttered under and around the dash to allow anything remotely approaching the size of the standard 'mobile' transceiver! Until we get a rig the size of a dual-bander, then, here's your solution...
- 22 INTERFERENCE — CAN YOU GET RID OF IT?** Perhaps you need to understand what the various forms of interference are before trying to conquer them. Janusz Skarbek, VK3IOU, explains...
- 25 WIN A TRANSCEIVER!** We're at it again, but this time it's easy to snare a great new Yaesu FT-26 handie-talkie courtesy of **Dick Smith Electronics** and **ARA**!
- 30 MORE PROPAGATION TESTS ON 196 kHz:** If at first you don't succeed... All they wanted to do was cross the Tasman on a sub-200kHz radio wave. What could be simpler, you ask?
- 34 AUSTRALIA'S SIX METRE DXCC!** Well, not exactly. Since six metres was given to Oz amateurs way back when, there have been hardy souls trying to crack the DX, and this is a list of their combined achievements. Perhaps the greatest surprise is just how long ago some of these record-making contacts took place!
- 35 BONUS STEWART ELECTRONICS '93 CATALOGUE**
- 76 COMPANY PROFILE — SCALAR ANTENNAS:** Having undergone something of a metamorphosis, Scalar is once again catering to amateurs.

**Cover:** It's a trial, isn't it? You buy a fancy new car and suddenly you realise there's not a chance of a snowball fight in Hades of fitting your mobile HF rig... anywhere! Blame it on the gadgets and the insistence on ergonomic design. So what do you do? Buy a Kenworth? Even the once-humble four-wheel-drive has all the gadgets in it. You may even find it hard to get the rig in one of them, too. The ever-resourceful Yanks came up with the idea a couple of years ago, but it didn't catch on here. Finally we asked if we could have one of Yaesu USA's remote kits — and it's great!

Next issue out November 24. Reserve your copy today!

## Regular Features

- 4—**QSP:** By Chris Edmondson, VK3CE.  
8—**NEWS DESK:** News in Brief...  
8—**HEROES OF HAM RADIO:** Vernon's sad tale...  
19—**CROSSWORD:** For *smarties*...  
26—**SUBSCRIBE TO ARA!**  
82—**SHORTWAVE:** Broadcast news from the ARDXC's Craig Seager.  
86—**AACP THEORY:** Part ten.  
90—**PACKET RACKET:** Okay, so whodunnit?  
92—**ON SIX:** All the latest news.  
93—**FOXHUNTING:** Alphabet soup...  
95—**YL FORUM:** Who needs Telecom?  
96—**DX & BAND:** Hot DX news.  
99—**KEEP YOUR SHIRT ON!!** You gotta get a great ARA tee!  
100—**PREDICTIONS:** IPS' December propagation forecast charts.  
102—**ADVERTISERS' INDEX**  
103—**CLASSIFIEDS:** Lots of radio and computer DEAL\$.  
105—**CROSSWORD:** Give up?





# amateur radio action

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Newsletter editors and publishers please take note!

# QSP

A few months ago we were absolutely delighted when the **Department of Transport and Communications** approached this magazine to publish a draft of the proposed new conditions of amateur

licenses. It looked as though the old hoo-doo of the department dealing only with the federal office of the **Wireless Institute of Australia** was finally over. We went to a great deal of time and effort to print the document *exactly* as it was supplied by the department, even attending to the smallest details like using the same formatting and typefaces the material had been supplied in. We were told that the department wanted reader response, that the regulations should reflect the needs of amateurs of the '90s. The regs should assist our experimentation, not hamper it, they explained. To assist readers in responding to the document, we even included a prepared 'response page' to save you some time.

Well, as a reward for our efforts we earned a huge slap in the face from the federal office of the WIA. In its weekly news tape, circulated to all state divisions and put to air on divisional broadcasts around the nation on Sunday, September 20, the institute's general manager and company secretary **Bill Roper, VK3ARZ**, implied that this magazine had broken some sort of embargo by commenting in print about the proposals. To make matters even worse, the claim was subsequently repeated in October's *Amateur Radio* magazine, the WIA's member-only journal. In part, he said "The WIA has honored the request from the DoTC that no publicity be given to any of the proposals...", which was tantamount to saying that we had broken a similar agreement.

I was greatly angered by the baseless allegations which, incidentally, actually went to air in Victoria as I was sitting in my deserted office typing that month's QSP! I had cleared the computer screen and was ready to type a sharp retort when, on reflection, I decided I should allow the institute the opportunity to air a full and unconditional retraction before venting my spleen.

I give you my undertaking that we had neither broken any agreement, either verbal or written, nor even breached any suggestion of the kind. This organisation publishes many magazines and newspapers, including **CB Action**, **Car Australia** and **4X4 Australia** to name but three, and is a part of the internationally-recognised *Fairfax* group which publishes *The Age* here in Melbourne and the *Sydney Morning Herald* somewhere to our north. Embargoes are a fact of life with which we are *well* acquainted and are very well equipped to cope with, sometimes even delaying on-sale dates for important announcements and releases. As it happened, neither the institute nor the department — nor anybody else for that matter — had asked us not to comment, so we went ahead and openly discussed the proposals (giving, you may recall, virtually all of it the 'thumbs up', and thanking the institute for its sterling efforts on behalf of all Australian amateurs).

A full and complete retraction of the allegation was formally demanded from Bill Roper on behalf of the institute, and a contrite Bill duly presented himself at our office some fortnight or so later to wave the olive branch. Later that same day we had reached an amicable agreement and Bill had faxed us the text of a new tape to be readied for airing on Sunday, October 18. On the tape Bill came as close as the institute would allow to apologising for misleading the audience and readers, going on to say that we (both this magazine and me personally) have not ever breached an understanding of confidentiality in any matters discussed between us.

Well, it seems the matter is not yet over, as the institute's Victorian Division decided not to air that week's federal tape which, we understand, happens on a relatively-frequent basis. In fact, last Sunday week's VK3 divisional broadcast contained no federal news at all,



which means the conditions of their undertaking have yet to be satisfied. I further understand the tape may have been withdrawn in other states as well, although I have yet to hear the final tally of who ran it and who scrubbed it.

Perhaps the October 25 broadcasts will be more forthcoming...

## While we're on the subject...

Look, the last thing any of us wants is a war with the institute, but fair's fair and enough is enough. Other segments of weekly divisional broadcasts have been taking liberties for a long time, and I know a lot of you agree with me about these. Let's start with **Whinge Number One**:

The so-called '**Technical Roundup**' of magazines heard in some states has been downright insulting to listeners for a long time. It suggests that the only articles *ever* worth reading are highly-technical in content. That's total crap. Each of us derives pleasure from different aspects of his or her hobby, and that's one of the things which makes it so interesting. So when I hear some self-appointed media expert saying "There is *nothing* (worth reading) in Amateur Radio Action this month" the announcer obviously believes the listener is incapable of deciding which bits he or she should or should not read. I cannot help but wonder though — if we had all the technical stuff and *they* did the reviews, would we then have a **Review Roundup** instead?!!

**Whinge Number Two**: For years some of the divisions have been getting away with 'blue murder' by 'announcing' the contents of *Amateur Radio* magazine on weekly broadcasts. Now come *on*! Until very recently WIA members had no choice in the matter — if they were members they got the magazine. Period. Okay, so the WIA broadcasts are there to tell the WIA members what's going on, right? So why tell the very people who receive the magazine what's inside it? Can't they read?

The WIA's many broadcasts are aimed at *all* amateurs and SWLs, not just WIA members. If you listen closely to some of those 'announcements', you'd swear you were listening to the *New Idea* spruiker! Some of the announcements I've heard simply do not belong on amateur radio. When you consider that the vast majority of the WIA's members still get *Amateur Radio* magazine as a part of the membership package, then at whom are these 'announcements' aimed? I can only conclude that some divisions of the WIA are deliberately packaging **advertisements** for *Amateur Radio*, and that these advertisements *must* be aimed specifically at non-members.

We cannot reply in kind. We can't run our own broadcasts — that would be illegal, totally contrary to the rules under which we 'normal amateurs' operate. I, and anybody who is paid to contribute articles to this magazine for that matter, am in the crazy position of not being allowed to talk about radio on the air because it could be deemed 'commercial'! We are effectively muzzled by the rules, but certain sections of the overall

☞ to page 20

## AMATEUR RADIO CORRESPONDENCE COURSE

The NSW Division of the WIRELESS INSTITUTE OF AUSTRALIA conducts a complete Correspondence Course leading to the AOCPE and AOLCP Examinations.

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# FT-890

## COMPACT HIGH PERFORMANCE HF TRANSCEIVER



# LOOKS LIKE THE FT-757GX

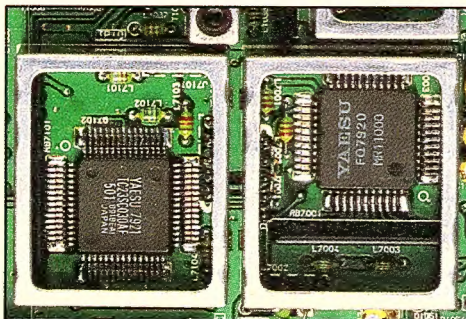
Every now and then a truly remarkable innovation takes place.... and you know immediately, that a legend is born! There's little doubt that the sensational new FT-890 HF Mobile Transceiver is just such a legend. Yaesu have incorporated many of the features from their renowned base-stations into this very compact mobile, so much so that we like to think of it as 'the FT-990 of mobile rigs'. Just like the FT-990, the new FT-890 continues Yaesu's design goals of making technically superior, feature packed transceivers that are fun to use and yet very reasonably priced. Compare the FT-890 with the rig you're using now!



### Clean Transceiver Operation

The FT-890 uses the very latest Direct Digital Synthesis (DDS) technology to provide much higher purity local oscillator signals than traditional PLL designs. The two DDS's ensure exceptionally low noise transmitter output, improved receiver performance and the very fast transmit/receive times needed for digital modes like packet radio. Together with the magnetic rotary encoder used by the main tuning dial, the DDS's provide the feeling of the best analogue VFO's... but with all the advantages of digital control.

\* By Neil Duncan, ARA Volume 15 no. 4



### Exceptional Receiver Performance

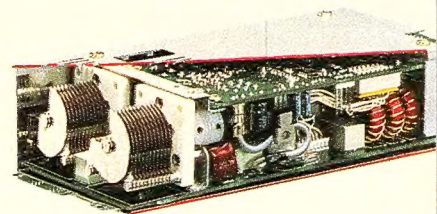
The FT-890's triple conversion receiver covers the entire 100kHz to 30MHz range with high sensitivity and a wide dynamic range. For clearer reception of weak signals, the receiver uses a low noise dual FET RF amplifier followed by an active quad FET mixer with a high first IF of 70MHz. All this ensures excellent image rejection and, together with the use of DDS local signals, results in receiver performance that is noticeably superior to previous designs.

### Flexible Transmitter Operation

Yaesu's innovative die-cast top panel heatsink and duct-flow cooling allow high duty-cycle transmissions with up to 100 watts output in SSB, CW and FM modes, or 25 watts carrier on AM. For the easiest operation the transceiver offers VOX, an Iambic CW keyer, full/semi break-in CW, an inbuilt SWR meter and an all-mode RF power output control. What's more, an RF based speech processor lets you tailor transmitter audio to your voice/microphone combination for greatly improved SSB talk-power.

### Automatic Antenna Tuner

An enormous bonus for the mobile HF enthusiast is the optional automatic antenna tuner (ATU-2) which is internally mounted and operated from the front panel. The ATU-2 uses its own microprocessor and 31 memories to automatically store tuner settings for exceptionally fast recall when you change frequency.



### Interference Rejection Facilities

For better reception under crowded band conditions the FT-890 provides both IF Shift and IF Notch controls.... and you can install optional filters for enhanced SSB skirt selectivity, as well as a choice of optional 250Hz or 500Hz bandwidth CW filters. Other valuable features include an effective variable noise blanker and a direct-feed mixer button for clear copy of very strong signals.

### Frequency Control

With a 16-bit main processor and four microprocessors frequency control is incredibly simple. Two independent VFO's per band have their own frequencies and modes, while tuneable memories store all of the data for both VFO's. Split frequency operation as well as memory/VFO transfers are a breeze.





# FT-890

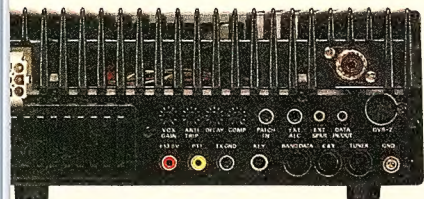
## COMPACT HIGH PERFORMANCE HF TRANSCEIVER



# GOES LIKE THE FT-990\*

### Incredibly Small & Light

The FT-890 is incredibly small and rugged, so it's well suited to both mobile and base station operation. Weighing in at under 6kg and measuring just 238(W) x 93(h) x 243(d)mm, it features quality epoxy PCBs and surface mount components for high efficiency, superb reliability and serviceability. What's more, there's no hanging rear heatsink to hinder mobile operation and the duct-flow cooling system ensures the FT-890 runs cool, even with high power cycle transmissions. A comprehensive range of rear panel connections gives added flexibility for base-station operation.



### Technically Advanced

The outstanding mobile HF transceiver incorporates a host of standard features which are not available on most other rigs in this price range. Take a look.....

The optional internal automatic antenna tuner operates on all HF amateur bands.... even 160m. Unlike the rivals internal ATU's only cover 80 to 160m! So, why limit your operations?

Unlike the inferior audio-based processors used in some competing models, the FT-890 uses RF-based speech processing because it's recognised as the most effective. In tough conditions Yaesu's unique frequency shifting RF processor will provide more punch to get your signal through.

- The audio-based notch filters used by some of its competitors can suffer from AGC lock-up. The FT-890 took the smart approach by using an IF-based notch filter to effectively reduce interfering carriers without being affected by AGC lock-up, even when notching strong signals.
- Wouldn't you like to have noise blanker performance that's referred to as 'the best in the mobile business' (ARA Vol.15 No4). Only Yaesu has it!
- Yaesu transceivers are covered by a 2 year warranty.... Why accept anything less?

A delight to use and an outstanding mobile rig by any standards. The sensational new FT-890 mobile HF transceiver is packed with features and offers performance and flexibility that until now was unheard of at this price.

Cat D-3270

Stock due early November,  
so place your order now  
to avoid disappointment.

# YAESU

# \$1995

#### Demonstrations:

An FT-890 will be on display at the following stores, so why not come in for a demonstration. You won't be disappointed!

#### SYDNEY

Showroom Ph 878 3855 31st August to 11th Sept 92  
Sydney Ph 267 9111 31st August to 8th Sept 92  
Parramatta Ph 689 2188 14th Oct to 23rd Oct 92

#### MELBOURNE

Springvale Ph 547 0522 14th Sept to 25th Sept 92  
Coburg Ph 383 4455 28th Sept to 9th Oct 92  
Bourke St Ph 693 0398 19th Oct to 30th Oct 92

#### BRISBANE

Brisbane Ph 229 9377 7th Sept to 18th Sept 92  
Cherryside Ph 359 6255 28th Sept to 9th Oct 92

#### ADELAIDE

Enfield Ph 260 6088 14th & 15th Sept 92  
Elizabeth Ph 255 6099 17th Sept 92  
Adelaide Ph 232 1200 18th & 19th Sept 92

#### PERTH

William St Ph 328 6944 12th to 17th Oct 92

# DICK SMITH

## ELECTRONICS



# NEWS DESK

Readers' contributions are invited.

News Desk, ARA, GPO Box 628E, Melbourne 3001

## What a bottler...

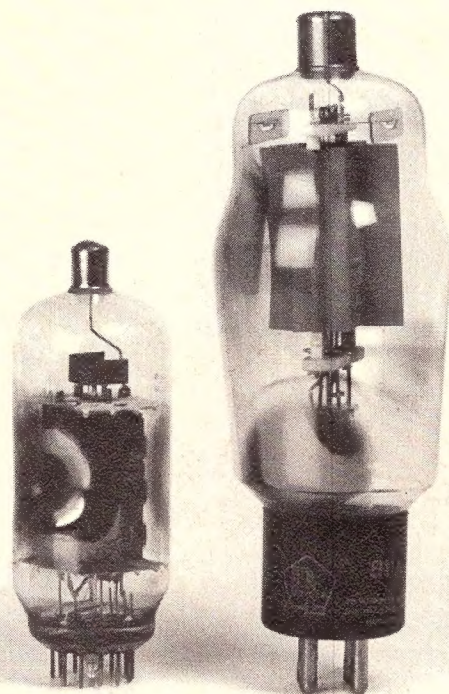
They say a picture is worth a thousand words, but we have a shrewd suspicion that in this case it's probably worth more like a thousand watts — or is that *amps*?!

These unfortunate valves have been carefully and artistically modified by over-enthusiastic HF operators.

The victim on the left, you may note, has a new air conditioning duct strategically placed on one side. We hear the electrons kept falling out after the modification...

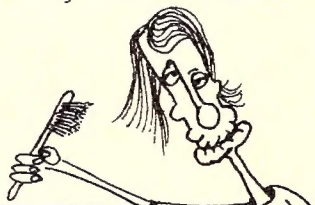
The larger effort on the right, we are assured by our reliable Washington correspondent, belonged to a gifted fellow named Vernon, who decided to try directing his signals heavenward and was rewarded by a bolt from the blue. You can see his tale below.

If you have some shots like this share them with us to win a free subscription.



## HEROES OF HAM RADIO #77. THE BALLAD OF VERNON

Vernon was so very tall  
You hardly missed his teeth at all.  
In truth he was the strangest man  
But then, of course, he was a ham.



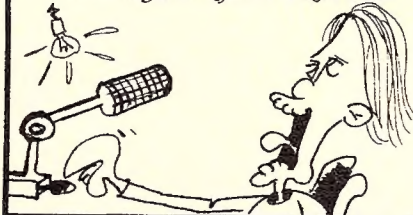
Because he was completely broke  
He lived on chocolate royals and coke  
Which goes some way toward explaining  
Why all his dinners needed straining.



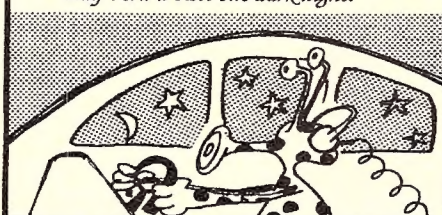
His shack, by contrast, was the very  
Best and latest, bought from merry  
Salesmen, who on seeing Vern  
Anticipated huge return.



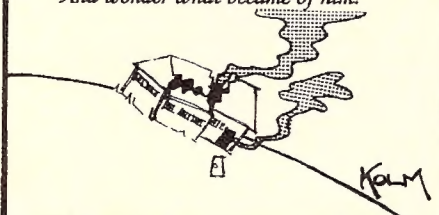
But now we reach the weirdest bit  
Which, knowing Vernon, seems to fit  
For Vern spent hours on the air  
And strange, dark forces lurk in there.



Far out, past Cygnus B, a star  
Heard Vernon's signal from afar  
Whereon strange beings thought they might  
Pay Vern a visit one dark night.



A bluish glow, a flash of thunder  
And Vernon's house was torn asunder.  
I often think of Vernon Simm  
And wonder what became of him.





## IOTA News

The Islands On The Air (IOTA) program continues to grow, and is attracting some considerable interest from HF operators. Our **DX&Band** man, **Jim Smith, VK9NS**, has supplied us with a list of some recent IOTA activities, with the IOTA number, the island's name, and QSL information.

In fact, it seems the popularity of the IOTA program has reached such heights that we've been asked by a number of people to explain what it's all about. Okay, why not? Look for the upcoming article soon. Meantime, here are the latest operations:

AF-019	Pelagie Island	IG9/I5WVI	Home call
AS-039	Bering Island	4K4NN	QSL to DK8FS
AS-064	Karaginskiy Island	RAØX/UV3DA UAØXAF/A	QSL to OK1AD
AS-075	Taipa Island	XX9TNH	QSL to CT4NH
AS-082	Dunay Island	UAØQFC/A	Home call
AS-098	Kara Ada Island	OH3MIG/TA4	Home call
AS-099	Alibey Island	OH3MIG/TA3	Home call
EU-080	La Toja Island	ED1ILT	QSL to EA1JP
EU-125	Romo Island	OZ1DYI/P	Home call
NA-029	Prince Edward Island	NU2L/VE8	Home call
NA-029	Prince Edward Island	VY6QST	QSL to K1ZZ.
NA-047	Baffin Island	NU2L/VE8	QSL to G3ZAY.
NA-111	Abescon Island	K2BR	Home call
NA-148	Appeldore Island	WF1N and NT1I	QSL to WF1N
NA-149	Tortunga Island	4V4H	QSL to KA9RLJ
NA-174	Iglolik Island	NU2L/VE8 WT2O/VE8	Home call Home call
NA-175	NWT Center Group	NU2L/VE8 WT2O/VE8	Home call Home call
NA-178	Farallon Island	KK6EK	Home call
OC-067	Tahaa Island	FO/F6HWU	QSL to F6HWU
OC-137	Bribie Island	VK4SC	VK4SC
SA-056	La Isla Island	HD4/HC2HV HD4/HC2FU	QSL to DL8NU or HC Bureau

Note: several operators in Thailand are interested in activating some of the HS islands, so you can look forward to activity from this region soon.

# NEWS DESK

## ATN ANTENNAS 56 CAMPBELL STREET, BIRCHIP Vic 3483

We manufacture a comprehensive range of HF, VHF and UHF antennas, baluns, power dividers, etc to suit your application. Three of our log periodics provide continuous coverage from 13-30 MHz including WARC frequencies and replace outdated tri-banders. Now in use in 31 overseas countries and 6 continents.

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- B&W BROADBAND ANTENNAS 1.8-30MHz, 3.5-30MHz RX RECEIVE ONLY, 100w & 1Kw MODELS
- HARD-DRAWN COPPER ANT. WIRE AND INSULATORS
- AUST/NZ DISTRIBUTORS OF CREATE ANTENNAS/ROTATORS & PHILLYSTRAN (KEVLAR) NON-CONDUCTING GUYING MATERIALS

- HIGH GAIN VHF & UHF AMATEUR, SCANNING & TV ANTENNAS
- BUTT SECTION TRIANGULAR ALUMINIUM TOWERS FOR FIXED OR TILT-OVER APPLICATIONS (Refer March/April 1987 AR)
- SELECTION OF POWER CHIPS & TX TUBES AT FRIENDLY PRICES
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
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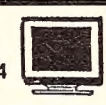
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# HF mobile — by remote control!

The Yaesu FT-747 gets a US-made remote kit

By Neil Duncan, VK3OK  
Heathmont, Victoria





### Editor's introduction:

Go back twenty years. The average car had stacks of room under its (usually metal) dashboard for amateur gear, even those big rigs which were state-of-the-art in those days. But the omnipresent effect of the Japanese invasion on the world's car industry saw more and more gadgets being pushed into even the most basic of vehicles, and the next thing we knew we were having more than a little trouble fitting radios of any kind into the dash, let alone under it.

Although contemporary mobile HF rigs are something like only half the size of their forebears, the latest crop of both cars and four-wheel-drives have *no* room for a rig to be properly installed. Even a svelte VHF/UHF dual-bander cannot fit in some vehicles, far less an HF rig!

While the manufacturers have continued to down-size their transceivers (and the problems of eliminating heat must surely mean there is a lower limit to size, cooling fans notwithstanding) the trend for VHF/UHF units at least has been to move to full remote-control facilities. All of the major players offer remote controls for their VHF/UHF radios — but what about HF?

Mobile HF has declined in popularity in recent years, perhaps because of tightening finances, but perhaps too because prospective purchasers of mobile transceivers simply could not find a suitable place to mount their transceiver. I even contemplated rebuilding an old car to be used exclusively for mobile radio purposes, replacing the front passenger seat altogether with a sturdy rack arrangement for radio equipment.

But that would be downright *silly*, and I knew it. How many people with a family can afford to register, fuel and maintain 'spare' cars these days just to feed a hobby?

When Icom released its very first HF transceiver — the IC-701 — it offered a remote control unit for roughly half of the functions, and this found some favor with users even then. But nobody offers anything like that any more. Perhaps the manufacturers reckon there's not enough call for it because people don't go HF mobile much any more. I reckon it's more a case that the people no longer go HF mobile because rigs which suit today's cars aren't available!

So to whom can you turn for mobile HF? Well, until now there have only been the 'commercial' solutions: Australia's **Codan**, which has its commercial/amateur hybrid 8528, or to **Wagner** or **Barrett** et al, or the US company **SGC**, which has its brilliant SG-2000. But the trouble with *all* of these radios is the push-button mentality. You won't find a VFO knob on any of them and, frankly, I'm yet to meet the amateur who prefers to use one of these push-button devices to a conventional rig.

So I paid quite a bit of attention to an advert in a couple of the US magazines a couple of years or so ago in which **Yaesu USA** announced it had developed a full remote control kit for the rather basic **Yaesu FT-747** mobile HF rig. The kit relied on the owner removing the original front panel, replacing this with a dummy front panel, then putting a new back on the front panel and connecting the two via a length of computer-type printer cable. It looked okay, too, provided you didn't mind the chunky Centronics connector poking out of the bottom of your new, shortened rig.

But the local Yaesu outlet, **Dick Smith Electronics**, hadn't heard anything about the kit, so I sent up a copy of the advert and let things lie.

And that's where things sat until reviewer **Neil Duncan**, **VK3OK**, got the mobile HF bug again, and this time it bit in

a big way. I'd been toying with mobile HF and had chatted a few times to Neil on my way home from the office, and that evidently awoke an old passion lurking somewhere within him. The problem, though, was that Neil had just taken delivery of a new car (which replaced an earlier one severely beaten up in a smash at almost exactly the same place where *my* big one happened!) and he simply couldn't find a suitable place to mount an HF rig. In fact, he couldn't even find anywhere to fit his VHF/UHF dual-bander, so it was in a state of near-desperation that he called me to discuss the problem.

After suggesting he could always swap his new steed for my old Ford porcupine (hope springs eternal!) I told him about the US kit I'd read about a couple of years earlier and things went from there.

A few days later, and I had explained the situation to Dick Smith's **Chris Ayres**. He agreed to bring in an evaluation remote control kit for the FT-747. We would use Neil's car as a guinea pig, and if the kit was any good the company would consider importing it in commercial quantities.

Our experience with the kit was very positive. After we fixed a small design flaw, the separated transceiver worked very well. However, as you're about to read, Neil found it a very complex job to install the kit — particularly given the additional modifications required. As a result, the people at Dick Smith's tried an installation themselves, then decided to offer the kit solely as a 'we install it for you' proposition. Part of the reason for this is that the Dick Smith technicians felt happier with the kit after making a couple of further modifications to the transceiver's circuit board, and decided to approach it this way for pure simplicity.

The price of the kit and modification has been set at \$449 installed. This figure applies to either a new radio purchased at the same time as the kit, or to a subsequent modification to your own FT-747.

I mentioned earlier that I had been running a bit of HF from my now-deceased Alfa, but the rig wasn't secured: in the absence of anywhere permanent to mount it, the HF rig had been sitting loose on the front passenger seat, while the faithful dual-bander was shoved in between the side of the driver's seat and the center console. Each time my XYL jumped in, the HF rig got chucked in the back behind the seat. Not really a professional installation, I'm afraid.

When the car was written off in a big smash back in June I looked around for something with enough space to safely accommodate HF, VHF and UHF gear, but it soon became patently obvious that such a vehicle no longer existed... unless I wanted a truck or the cheapest and most basic of cars — and I feared those 'littlies' would offer little more protection for my family than a roll of tinfoil in a half-way decent car accident, so I passed them by. And I didn't really see myself commuting in a Kenworth!

And so it was, with an eye to Neil's problems and my clear intention to have a similar mobile setup, that we decided to embark on rather different ways to achieve the same end result. We'll both wind up with HF and our VHF/UHF dual-banders in our cars, but the execution is completely different.

Nonetheless, over the coming months we'll report the whole saga of getting our rigs in and getting them to work. We'll also run a couple of articles examining the different approaches and the problems and pitfalls you are likely to encounter when emulating our exercise.

To begin, then, read about Neil's new HF mobile...



**T**he proud owner of a modern new car shouldn't have to gouge great holes in the crowded dash space to install an amateur rig, but that's the way car design has gone. (Even if he or she *did*, the darn thing probably wouldn't fit anyway.) The problem really compounds itself with HF radio operation, as these rigs are by nature fairly substantial.

I am a real fan of mobile HF. Rare DX on the way home, a 40 over 9, two-way chat with an interstate station or even a cross-town, 10 metre FM contact all add up to pleasurable pastimes. The problem is simply this — where can you mount a whacking great HF rig in a new car?

A while back, I had a car with an HF rig mounted in a clever home-made bracket (all modesty aside) welded up to fit where the center console would be in most cars. I sold the car not long ago, however, so the bracket now lives in the shed (it is still there if anyone wants to mount their TS-440S in a Ford Laser for free!). One magazine Editor I know, lucky so-and-so he is, found that his HF rig slipped beautifully into what appears to be a briefcase slot built into his Alfa's dash. That fixed that! (*That was no accident! Ed.*)

My new car, lovely though it is, won't give me the room for my dual band VHF/UHF rig, let alone a full-blown HF box, whereas in actual fact I really want *both*! As far as I can see, *every* modern car will present the same problem. Several remote-control VHF/UHF sets are available — but what about HF?

### The solution

The device on review here solves the HF problem beautifully. Take a new or old **Yaesu FT-747**, apply the **Remote Modification Kit (RMK)** being evaluated by us for **Dick Smith Electronics** and bingo, you have an HF rig separated from its front panel. The bulk of the radio mounts in the boot and the front panel ends up conveniently mounted somewhere on the dash. No gouging holes in the car, and the whole thing is reversible!

As far as I am concerned, evaluating the RMK means asking the following questions:

- is the modification easy?
- does the FT-747 work just as well after the modification?
- can the modification be reversed?
- is the cost-to-benefit ratio acceptable?

What I found was this:

The modification was fiddly and required good concentration for about three hours, although I guess that if I did another such modification I should now be able to do it in two hours. The radio's operation seems identical after the operation and yes, I could easily reverse the modification. The cost to make remote-control HF mobile a reality runs out to around \$450 more than the \$1300 or so for the rig itself. So, for about \$1750, you have a brand new HF rig with a simple and effective remote control. Not altogether bad!

### The modification

The RMK arrives from the USA in a small and plain cardboard box containing the two panels, a mounting bracket and a booklet. The panels are joined (temporarily) together and present an IQ test first up ("So where are the two panels they talk about?"). You soon work it out...

The 18-page booklet (bland, austere, A4 pages with a single staple) telling you what to do is also tucked away in there. Nine of those pages list dull-looking sequential steps

for the modification. The rest contain simplistic computer-drawn diagrams of the various goings-on during the modification.

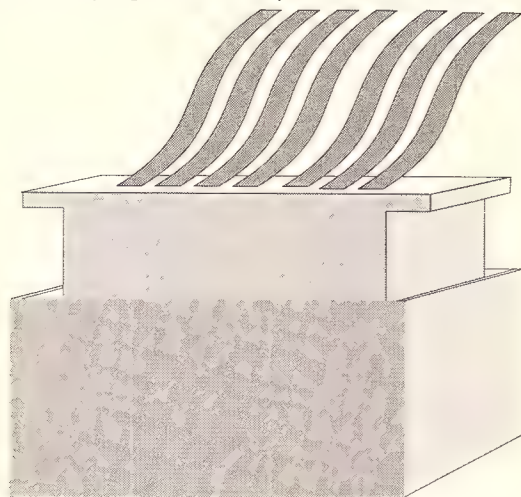
Now, remember that the FT-747 is an unashamedly entry-level HF rig. This becomes particularly obvious when you try step 1: taking the rig apart. The covers don't unscrew — they can't. They're made of a particularly flexible 'metallised' plastic which has little tabs and slots which unhook as you twist. Clearly, intelligence proved a problem here as the darned thing *refused* to separate for me for quite a while!

Both the top covers and the front panel work in this way, and when you finally figure it all out, you really feel a sense of achievement. Having popped the panels, you will be confronted with a great hairy mass of wire all disappearing down to a motherboard. What a sight!

### Removing the front panel

The majority of the modification steps consist of unplugging little plugs from their motherboard sockets and leaving them dangle. Later you plug in identical plugs from the kit into the same sockets. The front panel leads then, in turn, plug into the remote box's cables. That is, each of the original little cables is in effect handled three times.

It wouldn't be difficult to make a mess of any one of those little plugs, so considerable reserves of care and patience are definitely called for here. The use of a good set of long-nosed pliers helped a great deal (they recommend it in the manual). The plug and socket pair look like this:



While there are no hidden tricks, the danger is that you may pull one of the wires out of its plug, or perhaps you may even deform the plastic around the plug/socket set so that it won't fit any more. Neither event happened to me but that probably helps to account for a fair slice of my time taken for the modification.

There is also a power transistor to relocate. It is unscrewed off the main heatsink box used in the FT-747 final amplifier section. The transistor is later secured onto a place in the new, false front panel box. The procedure for all of this is well documented and clear warning is given about the innovation needed in one aspect of the 'lead bending' operation. In fact, this aspect is quite straightforward.

There are three earth straps to remove too. They connect the original front panel to the heatsink and therefore need to be removed. Later, they strap the (remote) front panel to the new back-plate. Again, this is an easy operation. However, if you drop a screw into the rig proper in either this or



the 'move the transistor' operation, you will have some horrifying searching to do. Needless to say, I did *just* that. The solution is easy. Put a lump of blue-tack on the end of a screwdriver and go fishing! I reckon they could almost supply some with the kit!

Finally, before the panel comes off, there is a ribbon cable to deal with. This is probably the most delicate operation of all. It is initially seated in a miniature spring-loaded, 12-way socket arrangement. Press the appropriate bar and gently pull the cable away — that's all. Hmmm, that *sounds* easy!...

### Installing the new panels

Having separated the front panel from the rig, the idea is to put a new dummy panel where the proper one used to be. What you currently have is a box with no front panel or top and a mass of wires heading in every possible direction. Looking at the mess, the mind revolves around several key thoughts: 'what *have* I done?', 'can a radio be fixed after such a severe disembowelling?', 'whose stupid idea was this?', 'what a mess!' and 'can I go now, please?'. (*Gee, I wish you'd had the camera handy, Neil... Ed.*)

To the blessed rescue comes the second half of the process. The new front panel has a heap of wires — just like the ones which used to be on the *real* front panel. You start with the ribbon cable and work your way in the reverse direction to the one you have already travelled. Such matters as the 12-way ribbon cable and the power transistor are taken in your stride this time. The result is a new, highly boring-looking front panel for the rig with just one thing on it — a Centronics printer cable socket.

That panel is secured onto the rig and the covers are installed just like they used to be. In front of you at this stage is an FT-747 with a rather inoperative-looking arrangement where that sparkling panel used to be! Time now to move on to the remote panel...



*The front panel ready for the car.  
Note the front-mounted  
speaker which makes  
the 747 ideal for  
remote!*

The false back-plate for the real but chopped off front panel contains lots of little sockets, just like the ones on the motherboard, but dangling on leads rather than secured anywhere. It must have taken ages to do up all of these sockets and to heat-shrink them all. No *wonder* the kit is relatively expensive!

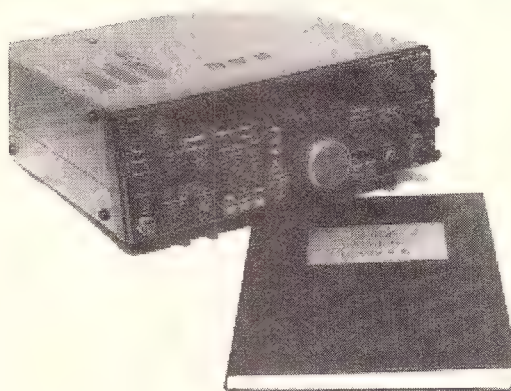
Anyway, the idea is simple — you simply plug each of the dangling front panel leads into the matching socket. There are two snags, though: First you have to warm the soldering iron up and solder that 12-way cable to the Centronics socket. That operation also involves taping over an unused lead on the ribbon cable — you will need to find some insulation tape and get the wires in the right places.

Secondly, you will need to sort out some ambiguity with respect to a particular pair of cables. This aspect could have been better documented in the manual and, needless to

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say, I fell for the Murphy's rule consequence of going the wrong direction. Never mind, that is all eventually covered and things can be reversed quite well (without blowing the rig up in the process, I hope. Ed.).

The earth straps are a bit tricky, but with some care and with, would you believe, some allowance for the variations within the final assembly of the FT-747 panel itself, you can eventually achieve all of the changes and new connections.

What is actually on that front panel? Well, there are all kinds of ICs and transistors back there. The frequency display, dial mechanism and several other goodies have their complex logic taken care of right on the panel. Some controls, such as the memory switches, want simply to run straight through the cable to the rig itself where they are 'decoded'.

It must have been a relief to the designers of the RMK to find that the number of individual wires needed to connect the panel to the rig could be met by the use of a stock-standard computer-style Centronics printer cable, because that obviously kept the cost of manufacture down. It is a pity that such a chunky cable was chosen, though. Look at the size of some of the multi-way cables on the market these days. Surely something more elegant could have been chosen! On the other hand, it would take a lot to damage this cable when it is in the car — a chain-saw or better I reckon.

*(Don't forget the clear need to isolate the information on the cable from high RF fields, Neil. The cable appears to be very well shielded indeed. Ed.)*

### Mounting the rig

The whole idea is to mount the front panel on the car dashboard and the FT-747 itself in the boot of the car. In my case, I used the supplied bracket at the dash end of things and made my own bracket for mounting the rig in the boot. The whacking great cable dating back to the dinosaur era was heaps long enough and I

purchased some 'monster-cable' of similar length for the DC run (via a 30 amp fuse) to the boot. That is the furthest possible cable run (diagonally opposite corners of the car) and I reckon warranted some good cable.

Why splurge out for such expensive DC cable? Remember that rigs like this can draw up to 20 amps, and even 0.5 of an ohm will cause havoc here. A simple application of Ohm's Law will verify this!

A proper earth return is needed at the rig end. These are a little hard to come by in the boot and, as I feared, an electric drill is needed. It was heart-wrenching enough demolishing an absolutely brand new FT-747 — now I have to drill into the new car! Gee, I hope all this stress will be worth it!

In the long run, I (just) avoided drilling straight into the petrol tank, didn't drill horizontally to make panel-beating a very real threat, and installed a solid earth lug with a self-tapper quite easily.

The only other matter is the antenna. I find that the use of an antenna enhances HF operation quite substantially. Now, as we have some new all-Australian products to present to you soon, describing this aspect of the installation will have to wait a little. Suffice to say that the antenna choice is quite spectacular and is well worth waiting for.

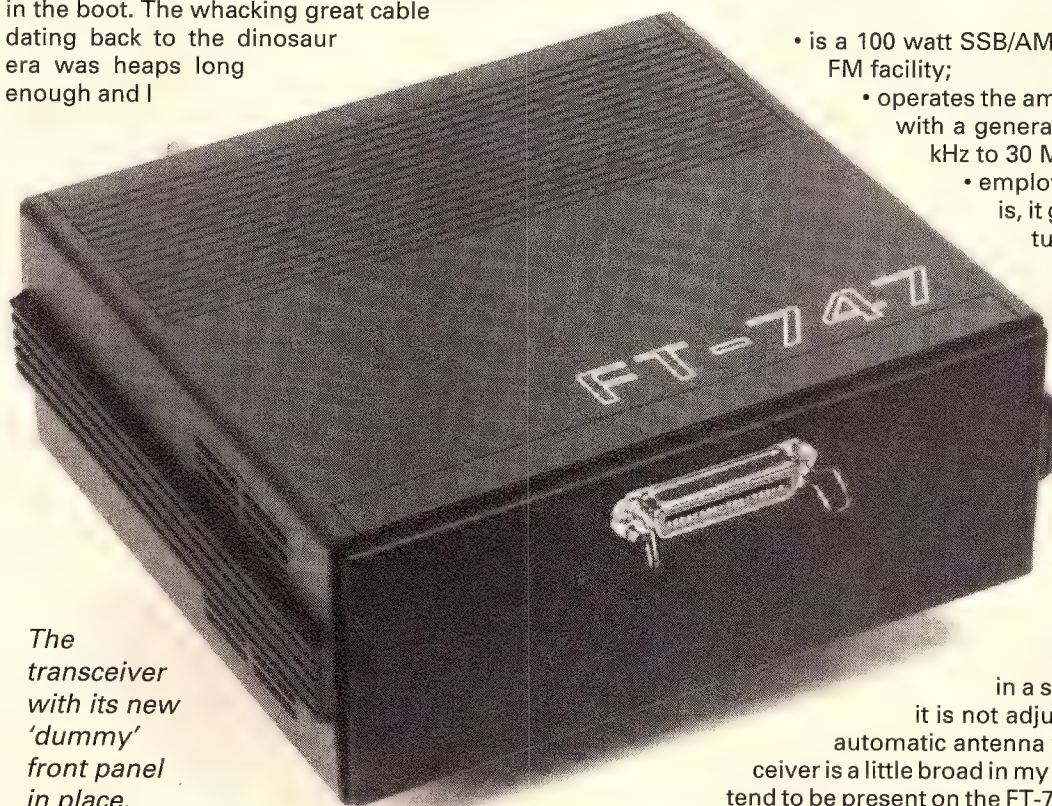
The antenna coaxial-cable run is very short indeed and is a definite plus for a boot-mounted rig. After all, the less RF floating around inside the car the better, I reckon!

### On the air at last...

This is not really the time to evaluate the FT-747. (See *Amateur Radio Action*, volume 11, number 11 (Feb 1989) for the full review. Ed.) Suffice to say that it is a basic rig by today's standards and does its stuff without any fuss. Perhaps a summary of its major attributes is in order though. It:

- is a 100 watt SSB/AM transceiver with an optional FM facility;
- operates the amateur bands 160 to 10 metres with a general coverage receiver from 100 kHz to 30 MHz.
- employs a 'detented' VFO knob. That is, it gently goes 'click-click' as you tune. Believe it or not, I prefer it in a mobile situation. Compare it with a conventional system if you are tuning around when you go over a speed hump!
- has 20 memories which store mode, simplex or split frequencies
- offers 'priority channel monitoring'
- has a noise blanker, receive-only clarifier and an internal cooling fan.

The noise blanker works in a satisfactory manner, although it is not adjustable. There is no matching automatic antenna tuning unit available. The receiver is a little broad in my opinion. Neighboring signals tend to be present on the FT-747 whereas they are invisible on a top-end rig. This, I feel, is more due to filter character-



*The transceiver with its new 'dummy' front panel in place.*



The back panel is quite basic. The cooling fan is at the top right of the rig.



istics than any cross-modulation or other problem. Certainly there is not a problem unless you are intending to work rare DX when the big guns are running 'next door'.

I reckon the level of receive audio could be a tad higher. The speaker is mounted in the remote panel itself which is terrific (one less thing to mount) and, given its size, I am tempted to say that the level seems acceptable. There is only so much you should expect — but is it enough?

On transmit, the set is stable, powerful and, overall, has a respectable audio response. I chose to modify this side of things a bit by tweaking the two trimmer adjustments on the back panel marked 'carrier adjustment'. They tell you in the manual not to do it without test equipment but certainly a far better bass-to-treble response ratio was made available this way. Maybe my voice suited the adjusted set better as I received some very good reports after I had a go at them.

Overall, the FT-747 presents itself as a very good mobile performer. SWR is a problem for those with mobile installations and frequency-agile tastes. Most seem to have their spots, however, so that is not usually a prohibitive problem. The FT-747 is happy to transmit into a reasonable SWR, but does drop off in power rapidly above 3:1.

The receiver sensitivity, stability and ease of operation is all that you could want for the majority of the time. Yes, there are some extras I could have asked for, but what is on offer is really quite sound! By way of comparison, a list of attributes of the two other Yaesu rigs of similar stature is presented at the end of this review.

### Kit evaluation

My first comment is that installing the RMK is not for the faint-hearted. Having purchased a perfectly good FT-747, you are expected to rip into it to the point where it is unrecognisable! The instructions are presented in an austere and, in some instances, vague manner and that doesn't help at first either! (Another very good reason why DSE decided to offer the kit as a 'we-install' proposition. Ed.)

On the other hand, the sequence presented to you in the notes really goes well and presents no great difficulties. I guess the hardest parts for me were **1)** removing the rig covers for the first time **2)** soldering that 12-way ribbon cable and **3)** the ambiguity surrounding a pair of very similar cables met near the end of the proceedings.

Once having completed the steps, the FT-747/RMK combination worked first time. The most obvious things from the word go however, were an unacceptable problem with RF feedback on transmit and a lot of hash on receive as you tuned around. That came as a bit of a worry, I can tell you!

A complete resolution of both problems took two steps. The first was to connect a proper earth to the connector marked 'Earth' on the back panel, and the second was to make a modification to the RMK itself.

You see, as supplied the kit does not have you end up with the outer braid of the cable linking the rig with the remote front panel, connected to earth inside the rig. That amounted to an unshielded cable, a problem easy enough to fix — an earth strap between the Centronics connector and the heatsink inside the radio took mere minutes to install and made a *huge* difference.

## AMATEUR SALES SPECIALIST

We are currently looking for an Amateur Sales Specialist for our North Ryde (Sydney) showroom. The successful applicant will be responsible for the sales, merchandising, and customer service needs of our Yaesu customers. Other duties will include sales of our general range of merchandise, as well as administration and housekeeping duties.

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- A current Australian Amateur license of any grade, although an AOCPL license would be a distinct advantage
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I'm amazed that such an error was allowed to slip by. Mind you, without this earth strap, you could think things were okay provided the remote panel was held well away from the rig. Get that panel nearby during transmit and whoooooeeeee!

In my humble opinion, installation of the RMK should only be undertaken by an experienced person with respect to this type of equipment. Despite this, I managed to get the rig up and running straight away and found the whole process quite straightforward.

At the time of writing, I understand Dick Smith Electronics will be offering the kit on the basis of 'you send us the rig and we'll install the kit'. To my mind that is quite sensible given the number of things which could go wrong in the modification process.

In terms of the actual materials in the RMK cardboard box when it first arrives, I must conclude that the RMK seems terribly expensive. On the other hand, the amount of time it must have taken to create, terminate and check all of those miniature cables must be large and would account for a fair whack of the cost.

In any case, I don't actually see it that way. In effect, there is now a rig (this one!) on the market costing around \$1700 which allows you to have a front panel remote from the rig, and for owners of virtually *all* modern cars, that makes the difference between HF mobile capability and none at all. That's a better way of looking at it.

## Value

Finally, let's look at the three Yaesu rigs before we conclude. There is the FT-747 (with or without the RMK modifications), the FT-757GX mkII (now getting a little old and being run out) and its recently-offered replacement, the FT-890. Perhaps you may be able to evaluate what is going on here from some other perspectives. All three rigs are evaluated without an ATU unit and in 'off the shelf' condition:

### Frequency coverage (transmit)

#### FT-747 and FT-757GX mkII

1.5 - 1.9999 MHz  
3.5 - 3.9999 MHz  
7.0 - 7.4999 MHz  
10.0 - 10.4999 MHz  
14.0 - 14.4999 MHz  
18.0 - 18.4999 MHz  
21.0 - 21.4999 MHz  
24.5 - 24.9999 MHz  
28.0 - 29.9999 MHz

#### FT-890

1.8 - 2.0 MHz  
3.5 - 4.0 MHz  
7.0 - 7.5 MHz  
10.1 - 10.5 MHz  
14.0 - 14.5 MHz  
18.0 - 18.5 MHz  
21.0 - 21.5 MHz  
24.5 - 25.0 MHz  
28.0 - 29.7 MHz

### Frequency coverage (receive)

FT-890 and FT-757GX mkII: 150 kHz - 29.9999 MHz  
FT-747: 100 kHz - 29.9999 MHz

### Transmit power:

All three: 100 watts SSB, 25 watts continuous carrier

### Modes:

All three: LSB, USB, CW, AM  
Note: FM is standard on the FT-890 and FT-757GX mkII, optional on the FT-747.

### Sensitivity: (SSB, above 1.5 MHz)

All three: 0.25  $\mu$ V for 10 dB S+N/N

**Stability:** 10 ppm on the FT-890 and FT-757GX mkII, and '200 kHz' on the FT-747.

### Clarifier:

FT-747: receive only,  $\pm$ 9.975 kHz  
FT-757GX mkII: unlimited, but receive only  
FT-890: receive only,  $\pm$ 9.999 kHz

### Receiver type:

FT-747: double conversion, no notch or shift  
FT-757GX mkII: triple conversion, notch and shift controls included  
FT-890: triple conversion, with notch and shift

### Memories:

FT-747: 20  
FT-757GX mkII: 10  
FT-890: 32

### Noise blanker:

FT-747: fixed type  
FT-757GX mkII and FT-890: adjustable.

### Weight:

FT-747: 3.3 kg  
FT-757GX mkII: 5.2 kg  
FT-890: 5.6 kg

### Dimensions (WHD):

All three: 238 X 93 X 238 mm

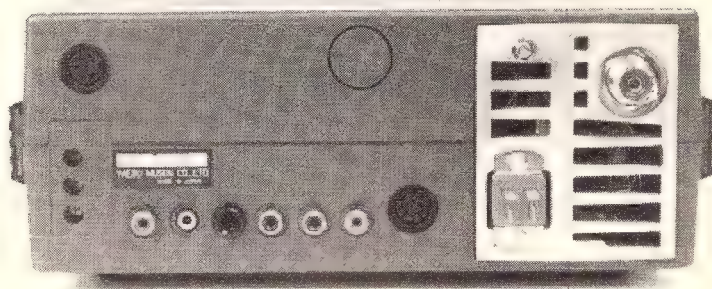
### Other:

**FT-747:** priority channel monitoring, wideband AM and narrow CW (500 kHz) as standard.

**FT-757GX mkII:** Switchable receiver RF amplifier, wideband AM and narrow CW (500 kHz) as standard.

**FT-890:** Quite a few things, including: RF speech processor, SWR meter, VOX, repeater offsets, internal ATU option to mention a few. Substantial filter set built in.

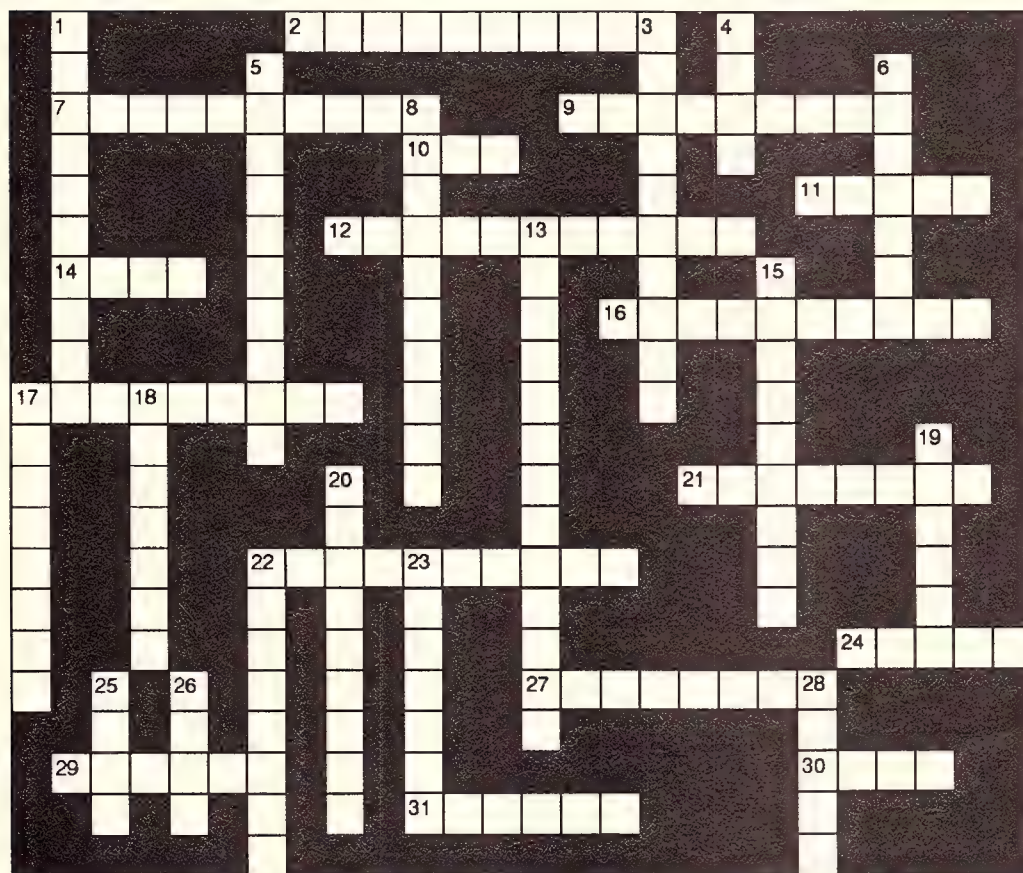
**Amateur Radio Action** thanks **Dick Smith Electronics** for the supply of the review unit.





# THE "SO YOU THINK YOU KNOW IT ALL" CROSSWORD

Produced for Amateur Radio Action by Wurd's'r'Us



## ACROSS

2. A type of insulator.
7. Winding loss in a transformer is also known as (6,4).
9. What is the total opposition to an AC in a circuit?
10. This is one type of non-magnetic material.
11. The unit of capacitance?
12. Magnetic lines of force are measured as ..... (4,7).
14. What does the 'wind-

16. ing loss' in a transformer consist of?
17. What were capacitors once called?
18. A magnet which quickly loses its magnetism is termed to be ..... magnet.
21. Magnets are usually made of this material (4,4).
22. The letter 'T' in a formula relating to transformers stands for what (5,5)?
24. The unit of inductance.
27. Wire wound onto a

29. coil is called an ..... Faraday's law talks about what sort of induction?
30. Who wrote the theory explaining the reaction between two magnetic fields—no, it wasn't Faraday.
31. What is the name of the fixed plate in a variable capacitor?

## DOWN

3. The total plate area is increased when ..... are in parallel.
4. A type of current associated with a transformer.
5. If it's not a 'natural' magnet, it's an ..... magnet.
6. Iron oxide constitutes the major component of ..... .
8. Magnetic ..... of a material occurs when a further increase in magnetising force gives no further increase in flux density.
13. What is the name (type) of shield used to prevent an electric field from inducing charges in adjacent circuits?
15. Mica capacitors consist of alternate layers of mica and (5,4).
17. This material is ferromagnetic.
18. Polycarbonate capacitors consist of two plates separated by what type of material?
19. Each group of atoms in a magnet is called a ..... ?
20. This is a common type of magnet.
22. One common type of solid electrolytic capacitor is the ..... .
23. The letters 'TC' stand for 'time constant in ..... '.
25. A threaded ferrite rod is termed a ..... ?
25. It rhymes with ducks.
28. A common type of electrical component.

Answers on page 105





# Feedback

Your letters to the Editor are welcome. They should be brief and to the point and, if selected for publication, may be subject to editing. Your letter *must* include your name and postal address, and your callsign if applicable, but these may be suppressed upon request, but always at the Editor's discretion.

Address your letter to **Feedback, Amateur Radio Action, GPO Box 628E, Melbourne, Victoria 3001, Australia**. As an alternative, you may fax your letter to (03) 670 9096 or (03) 602 1402

## QSP

from page 5

**Editor's note:** *Feedback has been held over this month due to the unusual length of the QSP column. Your letters are still welcome and will be considered for our next issue.*

Wireless Institute of Australia evidently believe they have some sort of approval to put advertisements of just about *anything* to do with radio to air.

In fact, it is my very clear understanding that the original reason given by the DoTC for allowing strictly-controlled advertising on weekly divisional broadcasts (and the reason the allowance was requested of it in the first place) was so that items of used radio equipment belonging to people in the area could be specified on air (for members only, of course!), as at least two thirds of prospective purchasers didn't get to see the institute's magazine and its handful of 'Hamads'. The incidental fact that *this* magazine carries the vast majority of classified adverts of interest to amateurs may have been conveniently forgotten at the time of the institute's dealings with the DoTC.

The resulting rule relaxation, I repeat, was quite specific — no identifying details of the owner (name, callsign, phone number or the like) could be put to air with the ad. Funny thing is that I don't recall hearing anything about the department at the same time approving the airing of advertisements for the WIA's commercial ventures! Although the institute's magazine is not available on book stalls it *is* run on a commercial footing, with paid-for advertising — it even contains some of the advertising material featured in these pages. Whether it runs at a profit or a loss is absolutely immaterial to both the department and the law.

We contend that some divisions of the institute put *Amateur Radio* magazine advertisements to air as a 'carrot' to attract prospective members. Frankly, I can understand the reasoning for this — its overall membership has been declining relative to total amateur numbers for years, and it now represents only a shade over a third of our number to government. That it is still regarded by government as the sole body with which to discuss regulation and change is fair in the light of no other organised efforts to establish an alternative lobby group.

Since this magazine first hit the news stands almost sixteen years ago it has often attracted criticism of being 'anti-WIA'. While some of my predecessors may have had different attitudes to me — and I cannot speak for them in any way at all — I firmly support the existence of the WIA and the things for which it stands... as long as it plays the game fairly and by the rules. As I said, I don't want a war — *none* of us do — but there are times when an alternative attitude needs to be aired, when the institute needs to be pulled up by its bootstraps and firmly told when it has overstepped the mark. There are always two sides to an argument, after all. Frankly, I think I've given the WIA a very easy time indeed in the years since I first sat in this chair.

What do you think?

**Feedback** awaits you — and I'll air *all* (printable) arguments!

## Home-brew competition...

I guess by now many of you will be wondering about our last competition, in which we called for worthwhile home-brew project designs. We were *deluged* with projects, *that's* what happened! Far from confirming our fears that the spark of innovation had all but disappeared from our fraternity, you startled us by burying our office in an avalanche of first-rate projects ranging from the tried-and-trusted to the revolutionary in concept.

To be scrupulously fair in awarding the first prize of an Icom transceiver, any identifying names and callsigns were removed before the submissions were duplicated for judging by an outside panel of experts. You'll know who the winner is soon, but in the meantime enjoy our latest contest to win a radio, and this time you won't need to design a thing!

See you next time, and we hope you enjoy Stewart Electronics' extra 40 pages this month. Cheers from **Chris Edmondson**, editor.



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# Beating HF interference

## Getting more value from your HF rig

By Jan Skarbek, VK3IOU  
East Doncaster, Victoria

Some people hit the power switch for the HF rig, listen for a moment, and if there's much noise around they'll switch it off and go watch the telly. Others don headphones, and flinch visibly with each roar of static and crash of lightning, but brave the ether for the chance at an elusive catch.

But why do either? If there are ways for you to beat the atmospheric and man-made noises, why put up with them? We asked Jan Skarbek to examine the noises and find a few answers...

**T**uning around the bands, one of the most common technical topics of discussion I hear is **interference**. It is the thorn in every amateur radio operator's foot. I found it quite strange, therefore, to discover that, while most of us suffer from a diverse range of problems, very few have taken serious steps to do anything about it. In this voyage into the world of radio gremlins, I hope to shed some light on the majority of these interlopers and suggest a few suitable methods of extermination — or at least, measurable relief.

Last month we looked at pocket pager interference, and found that there is an effective course of action available which works quite well. (As an aside, I have now had my **Jenlex HNF2** in circuit for almost a month, and I've not once heard the mute open due to pager interference, even with a 20dB receive pre-amp permanently in circuit. Yes, I do own one now, and the only fault I can find with it, is that it's so damned effective that I can never prove it's actually working — how do you prove a negative?) Wouldn't it be nice if there was such a simple solution to other interference problems?

Well there *is* — to a certain extent anyhow — and it all comes down to applying a bit of straight logic.

Recently, I was having one of my late-night QSOs with a similarly-minded amateur who lives not far from me, and found that the flow of discussion inevitably degenerated to interference. He said something along the lines of this: "I believe that, if you can positively track down what's *causing* it, you can *cure* it". At least, that's how I remember it.

Reducing interference to its lowest common denominator is the only approach which has any validity. If you could imagine for a moment that you were transported back in time by a hundred years or so, and were able to take all your radios back with you, you'd hear nothing.

Well, *almost* nothing. Apart from the odd static crash from the sky, cosmic radiation from the beginning of time, galactic noises from agitated stars and other assorted universal entities/particles and, once in a while, pops and clicks from the first spark-gap transmitters, you'd mostly hear silence.

### Blankety Blanks...

But if we then hit the noise blanker we would, in one fell swoop, have eliminated just about everything but the higher amplitude pulse-type noises.

Why? Because a noise blanker creates tiny holes in the passage of received signals of just the right size and shape to swallow up the noise before it reaches your speaker.

A noise blanker is an elegantly-simple, yet very much misunderstood device — as is an RF gain control, and the humble AGC circuit. Used or adjusted improperly, these three circuits can cause more aggravation than they're worth.

Those of you who have never seen an incoming RF signal on an oscilloscope would do well to study one (do you know of a local amateur who has one?). The best place to get a good look is at the output of the mixer stage, before demodulation. A noisy signal will be clearly evident, as its main property is a series of high-energy spikes which look like they don't belong there. The noise blanker circuit is set to look for such pulses — short duration and high amplitude. When an impulse of the correct shape is found, the incoming signal is simply shunted to ground, or gain is decreased from an amplifier chain.

The action is very similar to an AGC effect, except that the cycle lasts for a very brief time — so brief, in fact, that it normally cannot be heard. The signal carrying the intelligence sounds no different, as your brain doesn't notice the missing pulses — or gaps — in the transmission.

If your rig features a variable noise blanker control, you can wind up the sensitivity of the circuit so that it reacts more powerfully on progressively-stronger impulse signals. If you also have a wide/narrow setting on the blanker, you can select the circuit to act on wider than normal pulses, such as the 'woodpecker'. You see, the woodpecker looks, for all intents and purposes, like a giant noise pulse because of its dynamic properties.

So as the noise gets louder, stronger, and more frequent, you wind up your control. Wonderful, isn't it?

But, as in all things, the process does have its limits and limitations. If you have too much blanking, your brain starts



to register the missing portions of the signal (especially on weaker ones). The limitation is usually when a strong nearby signal is present and bleeds through your receiver. As you're looking at the edges of the side-bands of this signal most of what you hear is noise, which ends up looking like a nice meal for a noise blanker to swallow up.

Okay, but what if you don't have a variable noise blanker? Neither did my elderly Kenwood TS-120V. But it does now — and your radio can have one too. It's a simple matter of locating the blanker circuitry by identifying, from the circuit and block diagrams, which transistor does what. Follow the signal path and find a spot where you can decrease the attenuation (or raise the actuation levels) of the demodulated noise pulse. Change the associated fixed value resistor for a significantly higher value (eg 10K-ohm to 1M-ohm) and you're in business. To vary width, simply play around with different values of damping resistance in parallel with the existing pulse timing capacitor.

With this modification, I can now comfortably work an S9 station during severe (S9 + 50) thunder crashes by judicious use of my customised control. The trick to remember with any variable blanker is that it is a dynamic control, which requires regular adjustment for optimum performance. *(The other trick is to remember the exact path to the door so you can beat a hasty retreat when the lightning hits your mast. Ed.)*

If you already have a variable blanker but cannot see such a dramatic change in settings, your circuit either needs a tune-up, a beef-up, or both. You will truly be astonished at how much *better* it can work. And while you're at it, align the rest of the radio as well — if you do, you get more wanted signal for a given amount of noise.

Okay, so now we've reached the limit of the process. It's a bad night. The crashes are coming through longer, stronger and faster than bombs during the blitzkrieg. What do we do now? If you've got a variable AGC circuit, *use* it — if you don't, then modify it (try shortening the release time of the main AGC timing capacitor). Make the circuit work as fast as possible — better yet, variably. That way, you don't lose too much of a moderate to weak signal with your S-meter needle's stuck hard over on the right hand side of the scale. Of course, under these circumstances the AGC thinks it's doing its job on a strong signal, whereas all *you* hear is the loudest static!

What about the RF gain control?

This is a very straightforward facility which needs to be de-mystified. All it serves to do is to set up a minimum variable level which all signals below are attenuated — nothing more, nothing less. Low level noises disappear as the control is increased. It is not unlike a squelch control — except that it attenuates below-threshold levels, rather than amputating them. The optimum setting for this control is at a level which shows only slight S-meter deviations during speech peaks.

On many radios, better results may be obtained in very noisy conditions by having the RF gain control set somewhat higher than the actual incoming signal level on the S-meter. The reason for this is that the noise blanker doesn't have to work quite as hard nor as often, thereby reducing the number of audio gaps.

The difference between the 'before' and 'after' modification states is staggering beyond belief.

So there you have it. Even a cranky vintage radio like my TS-120V can be modified to work at performance levels significantly better than their original design allowed. In my case I am now able to work stations on 80 metres under the sort of conditions which meant I wouldn't have even heard them before.

The more-modern transceivers can also be significantly enhanced when the time is taken to analyse areas which could be improved from standard specifications.

Of course, we are dealing with analogue signals, and you can only do so much with an analogue signal in an analogue circuit. I suspect that further 'inventions' and technological breakthroughs are not all that likely — it's all been done before. It makes no difference if you have a dynamic range of 108dB or 80dB when dealing with impulse-type noise, as you're dealing with signals well and truly inside the linear design range of either system.

Let's take that a bit further:

Firstly, no manufacturer of HF gear goes chasing ultra-low noise figures in new designs. There's no point, as there's always a minimum level of noise on a band at a given time which is invariably above receiver noise-floor measurements. Also, low noise figure stages implicitly attract the lowest-possible linear dynamic range, as they're designed to work with weak signals and are therefore more susceptible to overload (non-linear operation). All this super-low-noise technology stuff is best left in the VHF-and-up domain where it belongs — where the state-of-the-art is pushing back the limitations of propagation and path-loss by learning how to resolve nanovolt signals.

Secondly, my library has several ancient technical handbooks dating back from the 1930s to the 1960s which have more sophisticated noise-reduction circuits than you can





poke a pulse at. To date, only a very small portion of these commercially-proven methods have been implemented in amateur radio gear.

Have you ever heard of 'Diversity Reception' (space, frequency, or polarisation) (*as implemented very nicely in the Yaesu FT-1000, perhaps?! Ed.*), or of the 'MUSA' system (Multiple Unit Steerable Aerial), or of logarithmic compressors and noise peak limiters? No? Then check out books like F Langford Smith's '*Radiotron Designer's Handbook*' or the Australian Post Office Communications Branch's '*Course of Technical Instruction Book*' (circa 1951). While the techniques used are primitive, the knowledge itself is timeless. These old books were written when commercial radio communication was in its infancy and being seriously researched by government departments and universities with unlimited funding. Now, however, we have the days of cost-cutting and budget slashing — if there's no immediately foreseeable cash return for a research project, it's likely to be shelved.

While you're at it, do yourself a favor and get a copy of '*Reference Data For Radio Engineers*', by ITT-Howard Sams (current edition). This should be the 'bible' of every radio amateur. While much of the theory is quite heavy, a lot of down-to-earth information can be gleaned at a glance.

The previous three modifications are not by any stretch of the imagination all that can be done.

So what *else* can I do?

## Types of interference

Back to earth, we still have mountains of other interference problems, and these can be broken into three main categories: naturally-produced interference (**QRN**), man-made interference (**QRM**), and electro-mechanically self-induced interference.

That's where we have to leave the time-machine scenario and deal with the present. We'll never again enjoy the wide open spaces of the virgin radio spectrum, because *everybody's* got something to say.

The naturally-produced stuff can all but be dealt with, implementing the previously mentioned techniques — but when it gets too bad, you just have to switch off. Unless you're really game and wish to experiment with a **noise-sampling canceller**.

This method implements a secondary antenna and receiver tuned to a slightly different frequency, or one tuned to the same frequency but which does not favor the direction of the incoming signal of interest. This secondary signal is optimised for its noise receivability. Simply subtract this secondary noise signal from the primary radio/antenna combination which is optimised to receive the information signal (with all its accompanying noise), and your problem is gone!

The process is elementary: (**Noise + Signal**) - **Noise** = **Signal**.

It'll work fine for a while — until the noise reaches ridiculous limits, the band becomes too crowded, the guy on the other end of the QSO gives up or goes deaf from all the noise spikes at *his* end, or your family looks around for

a spot to bury you shortly after you worked out how much the exercise cost.

Man-made interference (QRM) is a different case altogether, calling for a totally different set of tools. Enter **state-variable IF filters**. These include **notch filters**, **width controls**, **slope controls**, **narrow/medium/wide accessory filters**, **shift controls**, **audio peak filters**, and **audio bandpass filters**.

It doesn't matter much how you spell it, a filter is a filter. Some work better than others... and some don't really work at all. Some are even called something else for legal or marketing reasons.

The object of any filter is to allow only a defined slice of spectrum through. The sharper the response of the filter, the greater the desired effect — and the higher the purchase price.

Make no mistake, though, a high quality (as narrow as possible for the task) crystal IF filter will devour adjacent signals. But, only on the proviso that the primary interfering signal doesn't actually fall inside the passband of the desired audio.

Some communications radios come with very sharp filters, while others offer them as optional extras, but none of these filters can possibly discriminate human speech characteristics from noise or interference. They can only act as a conduit for a certain specified range of frequencies while rejecting others.

We can go too far and have too narrow a range of frequency response, and end up missing too much of what's being said — and that's what happens when the band gets to be too crowded: too many people talking all at once on slightly different frequencies. But we have to work with the added complication that *our* receivers, being imperfect (and not for lack of money), become overloaded when too many strong signals arrive at the same time. There are several terms and different ways that this can affect a receiver: **Inter-modulation Distortion** (the mixing of two or more signals creating a third), **Blocking** (when a stronger off-frequency signal desensitises a receiver), **splatter** (when a transmitter on a different frequency produces a 'dirty' signal rich in distortion products), and so on.

My order of preference when seeking the greatest relief from adjacent-frequency interference is: individual dedicated crystal filters, slope controls, width controls and, lastly, shift controls. Notch filters are more suited to zapping CW- and FM-type signals, while the ones which work at IF are vastly superior to AF versions. AF filters, I'm sorry to report, rank *last* on the list.

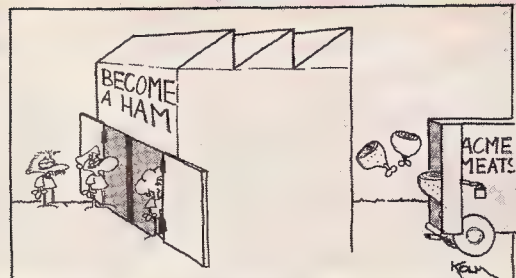
Is there anything around the corner?

Now I'm going to tell you that modern technology can do something about interference, using the only 'new' approach possible — **Digital Signal Processing**. And, oh boy, does that stuff work!!

I hope you will look forward to our review of the **JPS digital signal processors** in the next edition of **Amateur Radio Action**, when just about *all* your noise problems might *finally* be licked.







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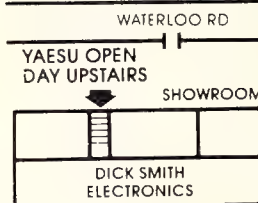
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Cat D-3494



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Cat D-3250



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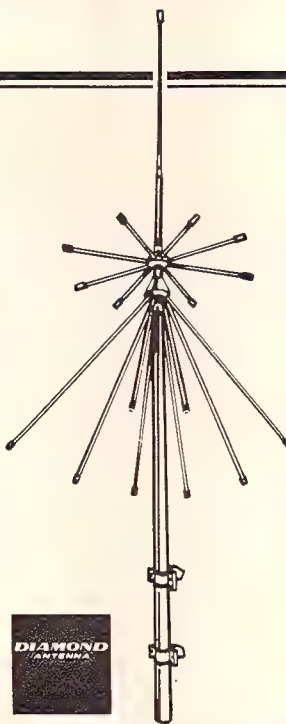
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5 YEAR WARRANTY

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## LOW FREQUENCY TESTS

# Amateurs on 196kHz

## Second trans-Tasman longwave test a success

By Donald Bainbridge, VK3BDJ  
Gordon, Victoria

Last month's **Amateur Radio Action** brought you the inside story of the recent long wave tests conducted by **John Adcock, VK3ACA** and the author of this article. Despite their best efforts, they were unable to get their signals confirmed by stations in New Zealand — the primary objective of the transmissions. The only answer, then... try again!

**F**ollowing our first test, which aroused a great deal of interest, a second 196 kHz test was conducted with the single aim of being heard in New Zealand. This test was conducted on September 13, 1992. To put the bottom line at the top, three stations — **ZL3PN** at Timaru, **ZL2CA** in Wellington and **ZL4MD** in Cornwell (a suburb of Auckland) confirmed that they heard the signal.

The first test was heard as far away as Hobart, Orange and Adelaide in the day and Perth at night. Several New Zealand stations listened but could not confirm that they heard the signal.

John Adcock and I reasoned that, since the signal was heard in Perth, it should also be possible for the signal to reach ZL. We had to improve the signal and have another go.

Following the tuning and loading difficulties the first time around when we used John's valve transmitter I decided to build a MosFET transmitter which should be more user-friendly. The new MosFET transmitter, with an output of around 85 Watts, was used for the September test.

An earlier experimental version of a solid-state transmitter also used mosFETs. It was actually based on an audio amplifier kit, described some years ago in *ETI* magazine, and had been slightly modified to work from 20 Hz up to 196 kHz.

The new transmitter produces its 196 kHz signal by dividing the frequency down by 20 from 3920 kHz. The reason for using 3920 kHz was that I just happened to have a crystal for that precise frequency on hand! *Much* cheaper than buying a new crystal...

The division by 20 was easily and cheaply achieved with two components which cost less than \$2 total! The output of the divider feeds a MosFET driver stage which feeds a Class C push-pull bank of eight mosFETs.

The power transformer for the transmitter came from an old TV. I rewound the secondary to provide about 32 volts AC. The most expensive part of the whole transmitter was the case...

After early trials, I decided to feed the transmitter's output through a harmonic filter. An early single-ended version of the transmitter had a harmonic problem — the 18th harmonic was heard 80 km away!! The solution was to go to push-pull to cancel the even harmonics and to put in a harmonic filter.

The next improvement was the antenna tuning coil. The new fourth generation of the coil was wound on a PVC water pipe of 315 mm diameter. The wire used is rectangular in cross-section and wound on edge. Winding a flat conductor on its edge reduces losses within the conductor. The new coil has 56 turns and a Q of 320. The transmitter couples into the coil by a fixed two-turn link.

I think that there are still some scope for improvements to the coil. One improvement would have been to make the transmitter coupling link rotatable.

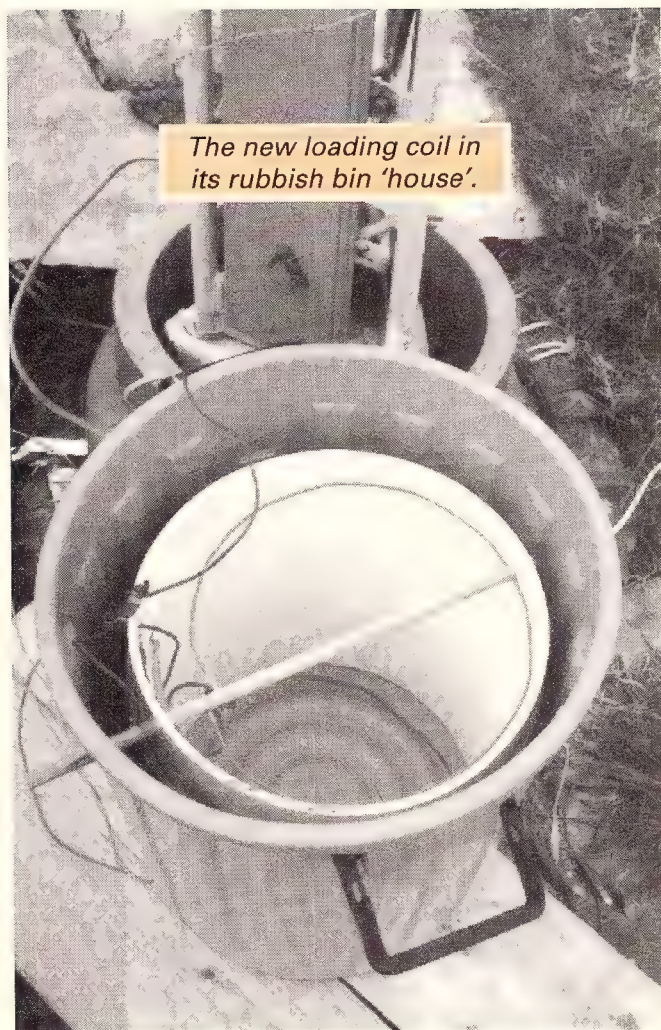
I note that if a much larger inductance is needed it is easier to build coils of twice this Q. The losses in this coil will be equivalent to a series resistance of about 6Ω. The new coil is also adjustable. It has a single turn which can be rotated up to 360 degrees to either buck or boost the main coil for fine tuning adjustments. The coil also has a number of fixed taps.

Using this new coil increased the antenna current

from 3.1 amps to 3.8 amps. During the latest test we were able to graphically demonstrate that the antenna current is affected by moisture. The current seemed higher in the late afternoon. However, when it was raining the antenna current was reduced by up to 10 per cent. I think that this can be explained by loss in insulators as well as the soil and vegetation. Rain also affects the tuning of the antenna; it is







*The new loading coil in its rubbish bin 'house'.*

necessary to retune slightly during rain. Water has a dielectric constant of 82. Consequently the capacitance of the antenna increases slightly during rain.

The mast is insulated from ground by a Japanese NGK 22,000 volt insulator made in 1956. It is not the type of insulator which mounts on a power pole but it is designed for use in large zone substations where hardware is bolted to a metal plate which forms the top of the insulator. This insulator was obtained from the scrap bin at the local electricity depot...

All the guy wires are insulated by ceramic electric fence insulators. Where the guy wires attach to the mast I used three insulators in series. I chose to use three insulators after reading an article in *Amateur Radio*. I prefer to use ceramic insulators as I have had a plastic insulator catch fire...

The voltage on the antenna is in the order of 3000 volts. Being very much smaller than a quarter wave, the voltage is almost constant over the entire length.

The grass is attracted by the high electric field near the base of the antenna. Each time we keyed the transmitter, the grass could be seen to bend toward the mast in sympathy with the keying!

Along with the coil improvements, the antenna has been improved by the addition of more top-loading capacitance wires. There is now about 220 metres of top-loading wire (all of it between 80 and 123 feet above ground level). The capacitance is now estimated to be over 1200 pF. The effect

of this extra capacitance is to raise the radiation resistance and to reduce the number of turns needed on the tuning coil. Reducing the number of turns also reduces the loss in the coil.

It was apparent after the first test that a small house was needed to keep the coil dry for the next test. The 'small house' ended up being a blue plastic rubbish bin.

For the first test the valve transmitter was sitting inside the shack and feeding to the mast via a transmission line. For the latest test I had the transmitter sitting on box near the base of the mast. The power for the transmitter came from a weatherproof GPO which is mounted near the base of the mast. This facility of a GPO near your mast is well worth having at your station, as it is handy for all sorts of testing and for soldering irons, whipper snipers, and that sort of thing.

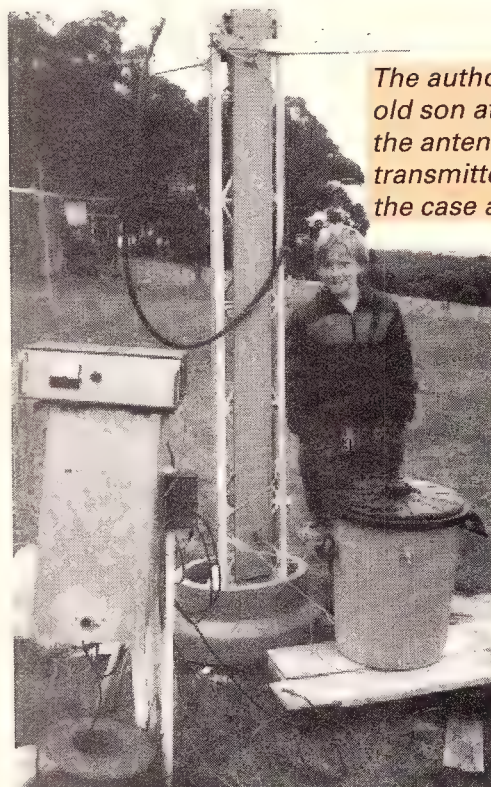
Since the successful trans-Tasman test I have had a number of phone calls from readers of **Amateur Radio Action** and others wanting to know more. I have even had a call from Port Moresby in PNG. The caller was told of the test by someone in New Zealand and subsequently tracked me down.

The caller from P29 said that he hoped that P29 soon might also have an allocation possibly in the 165 to 190 kHz spectrum. I was told that a beacon possibly around 183 kHz or 186 kHz might be licensed in the coming months.

It is possible that a test for interested listeners may be run one day during the Christmas-New Year period. I have also put the station to air for a few hours on some weekends.

The ZL stations are active on Thursday evenings. They transmit on 181 kHz and run a net on 80 metres to co-ordinate their activity.

With the prospect of hearing signals from New Zealand and perhaps from PNG as well as VK6 I can see that I must work on improving my receiving set up! You never can tell when someone might be calling...



*The author's 11-year-old son at the base of the antenna mast. The transmitter is inside the case at left.*



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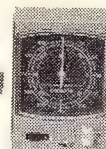
**RANGER RCI 2950 25W 10m t'cwr \$529 FREQ REG.....\$20ea**

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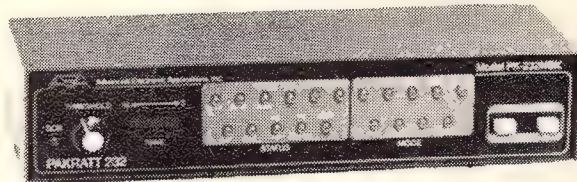
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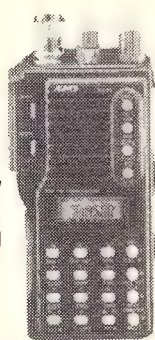
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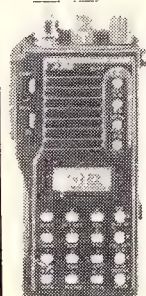
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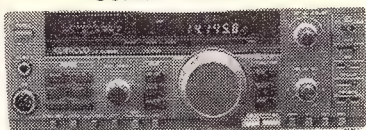
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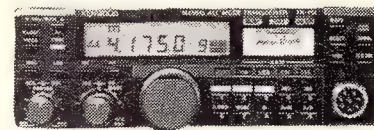
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# 100+ countries worked on six from VK!

The **VHF DXCC listings** is a preliminary list of 160 countries worked from Australia and its territories since 1950 on the six metre band. **Eric Jamieson, VK5LP** has been researching this subject and, after editing over 1400 entries in his database, came up with that staggering country count. Without stealing anyone's thunder, the fact that DXCC *could* have been worked some time ago, puts into perspective the current fuss over who worked what and when!

It is hoped to add significantly to the list once we get more log book entries and the co-operation of some of our older DXers. Without input from these and other past six metre members, it is not possible to complete an accurate account of what took place.

A number of the operators on the following list have changed their callsigns since making their record contacts. I'm sure the following list is far from complete, but the changes I know of are as follows: VK2ADE now VK4QM; VK2BNN deceased; VK9BP now VK8RH; VK9XK now VK4XA; VK9ZYX now VK8ZYX; and VK3ZAZ now VK3OT.

Thank you to **Eric VK5LP, Rex VK8RH, Graeme VK6RO, Neville VK2QF, Geoff VK3AMK, and Trevor VK5NC**, without whose help this task could not have been completed.

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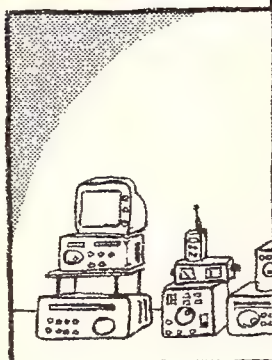
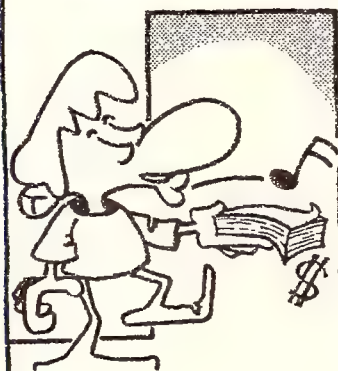
Station:	Date:	Country:	Claimed by:
3D2AG	23 MAR 92	Rotuma Island	VK2QF
3D2SM	20 MAY 90	Conway Reef	VK4BRG
4S7AVR	29 MAR 91	Sri Lanka	VK9YJ
4X1IF	01 APR 91	Israel	VK9YJ
5H1HK	05 APR 89	Tanzania	VK4BRG
5W1GA	05 DEC 86	Western Samoa	VK3AMK
5Z4CS	28 MAR 82	Kenya	VK8GB
6W1QC	12 NOV 90	Senegal	VK4BRG
6Y5RC	28 MAR 81	Jamaica	VK4PU
7Q7JA	27 MAR 91	Malawi	VK9YJ
8P6JW	18 APR 89	Barbados	VK2QF
8R1AH	02 APR 89	Guyana	VK8RH
9H1BT	25 MAR 89	Malta	VK8RH
9K2ZR	03 APR 92	Kuwait	VK6JQ
9L1US	08 OCT 90	Sierra Leone	VK4BRG
9M2DQ	26 SEP 89	West Malaysia	VK6BE
9M8STA	13 AUG 89	East Malaysia	VK8ZLX
9N1BMK	02 MAY 79	Nepal	VK8GB
9Q5EE	06 APR 91	Zaire	VK3OT
9V1ES	17 NOV 89	Singapore	VK8ZLX
9Y4LL	10 APR 82	Trinidad	VK8GB
A22BW	28 APR 91	Botswana	VK6HK
A35JT	12 APR 80	Tonga	VK8GB
A45ZM/mm	04 APR 90	United Arab Emirates	VK8RH
AH8A	19 APR 81	American Samoa	VK2BNN (SK) (KH8)
BV2DQ	30 AUG 91	Taiwan	VK4JH
BY5RA	28 SEP 84	China	VK8GB
C21AA	06 MAR 71	Nauru	VK4ALM
C6ANY	21 APR 92	Bahamas	VK2QF
CEØDFL	24 APR 90	Easter Island	VK4ZJB
CE3/KB6SL	14 OCT 90	Chile	VK4BRG
CN8ST	20 OCT 91	Morocco	VK8RH
CO2KK	16 APR 89	Cuba	VK2BA
CR9AJ	24 AUG 78	Macau	VK8GB (XX9)
CT1LN	03 MAR 91	Portugal	VK4JH
CU3/N6AMG	27 NOV 91	Azores Island	VK2QF
DLØSI	05 NOV 89	West Germany	VK6JQ
DU6/WB5LBJ	11 OCT 77	Philippines	VK8GB
EA8/G3JVL	21 NOV 89	Canary Islands	VK8RH
EI6AS	12 OCT 89	Ireland	VK8ZLX
EKØJA	20 APR 92	Asiatic Russia	VK8ZLX (UAØ)
ES5PC	29 JAN 92	Estonia	VK6PA
F9DI	13 OCT 89	France	VK8ZLX
FK8AX	15 DEC 78	New Caledonia	VK3AKK
FM5WD	11 APR 90	French Martinique	VK8ZLX
FOØCI	13 MAR 92	Clipperton Is.	VK4ZJB
FO8DR	12 APR 81	French Polynesia	VK2BA
FW/W6JKV	30 MAR 90	Wallis & Futuna	VK4JH
FY5AU	30 MAR 89	French Guyana	VK4BRG
G4FJK	20 MAR 89	England	VK6KXW
GD3AHV	28 FEB 90	Isle of Man	VK6HK
GI4OPH	12 OCT 89	Northern Ireland	VK8ZLX
GJ4ICD	12 OCT 89	Jersey	VK4DDG
GM4GDT	28 FEB 90	Scotland	VK6HK
GU2HML	01 NOV 89	Guernsey	VK4JH
GW3LDH	12 OCT 89	Wales	VK8ZLX
H44DX	26 APR 79	Solomon Islands	VK8GB
HBØAHB	13 OCT 91	Liechtenstein	VK6PA
HB9SJV	03 JAN 92	Switzerland	VK6PA
HC2BI	29 MAR 91	Ecuador	VK9YJ
HH7PV	19 SEP 89	Haiti	VK2BA
HI8WPC	02 APR 89	Dominican Republic	VK2BA
HKØ/W6JKV	28 MAR 92	San Andres Island	VK4JH
HK1JXV	19 MAR 90	Colombia	VK4ZJB
HL9WI	20 OCT 74	Korea	VK4ALM
HP3XUH	31 MAR 89	Panama	VK8ZLX
HR1WPK	02 APR 90	Honduras	VK5RO
HS1WR	15 MAR 80	Thailand	VK9XT (VK3OT)
I2CCD	03 MAR 91	Italy	VK8ZLX



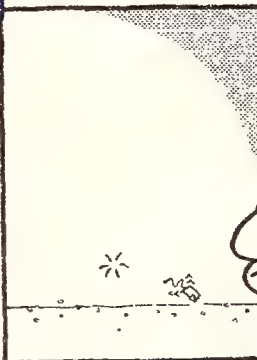
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73's from Stewart, VK3ESD and John, VK3ZJF

### INDEX

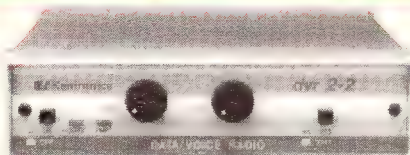
Antenna switches	52	DC outlet boxes	40
Antenna tuners	48, 49, 50	DIP oscillator	50
Antennas, active	40	Dummy loads	52
Antennas, HF beams	42, 45	Frequency counter	57
Antennas, HF verticals	42	HF linear amplifiers	72
Antennas, HF wire	46, 47	Icom equipment	74
Antennas, VHF & UHF beams	43, 44	Kenwood equipment	73
Antennas, VHF & UHF Hand held	46	Lightning arrestors	43
Antennas, VHF & UHF verticals	43, 46	Low pass filters	53
Audio filters	56	Morse code keys & keyers	54, 55, 56
Baluns	41, 53	Multi-mode data controllers	37, 39
Books, Antenna	62, 63	Packet accessories	38, 39
Books, ATV	67	Packet data controllers	36, 37, 38, 39
Books, Design information	58, 59	Packet software	37, 38
Books, for beginners	67	Phone patch	57
Books, General & reference	58, 59	Power meters	41, 50, 51
Books, History	67	Power splitters & combiners	70
Books, Morse Code	65	QRP transceivers	50
Books, Operating & DX	66	Remote control software	57
Books, Packet radio	61	Roller inductors	70
Books, QRP	61	Speaker microphones	40
Books, RTTY	65	SWR meters	40, 51
Books, satellite	64, 65	Transistors & hybrids	69
Books, VHF, UHF & Microwave	60	Valves, transmitting & receiving	68
Clocks	40	Variable capacitors	70
Coaxial cable	71	VHF & UHF power amplifiers	41, 70
Coaxial connectors	71	VHF & UHF preamplifiers	41
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ML040 DVR2-2 transceiver only **\$444**

ML040A Microphone to suit **\$53.76**

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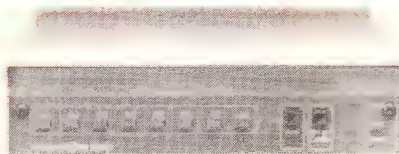


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## Kantronics Data Engine

The Kantronics Data Engine is built to keep pace with our changing times. If you'd like to run faster packet or do some experimenting, yet remain compatible with today's 1200 baud system, install a Data Engine at your station.

Today the Data Engine's standard configuration is AX.25 packet firmware and a 1200 baud modem. You may install a second modem for dual port operation. Modems are available with data rates up to 19,200 baud (must use appropriate transceivers). The G8BPQ Packet Switch (enhanced Net/Rom emulation) firmware is also available.

- \* EPROM socket supports up to 1/2 Megabyte of firmware
- \* V40 processor with 10 MHz clock (PC compatible)
- \* Each port capable of greater than 56 K baud, full or half duplex (depending on installed modems)
- \* Install modems internally, or externally via back panel DB-15 connectors
- \* Low power: nominally 150 mA @ 12 VDC (with DE1200 installed)
- \* Size: 45 x 150 x 225mm, Weight: 1.2kg

### Options

- \* Modem developer's kit
  - \* Firmware Developer's manual
  - \* G8BPQ Packet Switch firmware provides Net/Rom type network node and supports multiple ports.
- Download from our BBS and burn your own EPROM.

ML034 Data engine only **\$669**

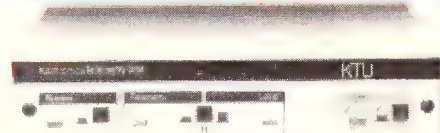
ML034A DE with 1200bps modem **\$792**

ML034M3 Modem developer's kit **\$45**

ML034M4 Firmware developer's kit **\$45**

ML036 DE 1200bps modem **\$172**

ML038 DE 9600/19k2 bps modem **\$212**



## Kantronics WeatherNode

The Kantronics Telemetry Unit (KTU) collects data from attached sensors and stores it in battery-backed RAM. This information can then be accessed via packet radio or telephone modem. The WeatherNode firmware enables the KTU to read attached weather sensing devices, store the information and then provide it upon request.

To request information from the WeatherNode, you simply connect, just like you would connect to any other station, and request information with the Data command.

The KTU connects to the serial port of your TNC, and may also be connected to your computer serial port. Front panel switches allow three modes of operation. The Local/Telemetry button selects local (via your computer) or remote (via your TNC) access to the WeatherNode program or data. The Bypass button bypasses the KTU completely and allows you to use your TNC just as you do now.

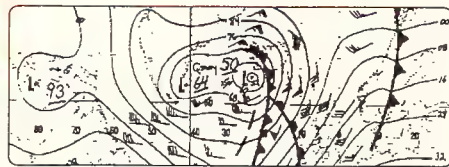
- \* Sensors supplied: external temperature sensor with 40' cable, and pc board temperature sensor.
- \* Temperature readings given in °F or °C.
- \* Data command allows you to retrieve only the information you want.
- \* Remote access (with password protection) for re-programming for site-specific needs.
- \* Connects to any TNC.
- \* RS-232 or TTL levels select with internal jumper.
- \* Accepts up to seven sensors, including up to three digital sensors.
- \* Up to two digital outputs (will reduce number of available inputs).
- \* Size: 1-3/4" x 6" x 8", 2-1/4 lbs.
- \* Power Requirements: 11v - 20 v, <45 mA With LEDs turned off: 11v - 28V, <30 mA.

ML043A WeatherNode **\$642**

ML043S3 Anemometer **\$244.20**

ML043S2 Rain gauge **\$190.80**

## SuperFaxII



## Weather Facsimile (WEFAX) reception programme for Kantronics TNCs

- \* Unattended mode: automatically detects, synchronises & saves picture to disk.
- \* Semi-unattended mode: automatically detects start of picture, synchronises, receives picture to buffer.
- \* Manual mode: synchronise incoming fax picture using function keys, capture incoming picture to buffer, turn buffer on/off, or save directly to disk.
- \* View from buffer or disk file, with the ability to pause display.
- \* Display black on white, or white on black.
- \* Print captured picture to Epson compatible graphics printers, custom setup for most 9-pin graphics printers.
- \* Choose 120 lpm for weather or 60 lpm for wire photo pictures.
- \* Split-screen terminal mode
- \* Supports CGA, EGA, VGA/MCGA and HERCULES graphics.
- \* Supports com1, com2, com3, and com4.
- \* Requires Kantronics KAM or KPC series using version 2.8 or later firmware.

ML055 Superfax for IBM-PC **\$45**

**Stewart Electronics is your only factory authorised KANTRONICS outlet in Australia!**

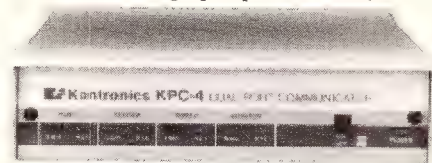
## KANTRONICS Packet only data controllers

- \* Software Carrier Detect — you can run open squelch and detect weaker signals.
- \* Personal Packet Mailbox (PBBS) features: programmable size, reverse forwarding, TO field editing, mail-waiting indicator.
- \* Automatically transfer connects to PBBS.
- \* Host Mode - Allows special terminal programmes access to all TNC features.
- \* Weather Facsimile (WEFAX) Reception (optional programme needed.)
- \* Full duplex capability.
- \* KISS mode makes TNC a modem and packet assembler/disassembler (PAD), for TCP/IP or BBS use.
- \* Baud rates: 1200, 600, 400, 300.
- \* 32K RAM.
- \* Supports up to 26 packet connections (streams).
- \* Size: 45 x 150 x 200mm, 1.2kg
- \* Requires 12 VDC at < 250 mA
- \* Optional SmartWatch — Stores PBBS messages, and keeps date and time when unit is turned off.



The KPC-2 is a single port packet radio communicator capable of data speeds up to 1200 bits per second.

ML031 KPC-2 single port packet TNC **\$365**



The KPC-4 is a Packet Communicator with two radio ports and two modems. You can operate from both ports at the same time, and if desired provide a gateway between them.

Most commands have dual-port settings allowing you to adjust each port to the characteristics of the radio attached and operating conditions.

ML032 KPC-4 dual port packet TNC **\$599**



# multi-mode mastery – Kantronics

- ★ Dual Ports
- ★ HF & VHF Packet
- ★ AMTOR Modes A & B
- ★ AMTEX / NAVTEX
- ★ RTTY (Baudot & ASCII)
- ★ CW (5-99 WPM)
- ★ Sophisticated PBBS
- ★ Can use different modes on VHF and HF simultaneously!

## \$670

Stock No.  
ML030  
inc tax Freight \$12

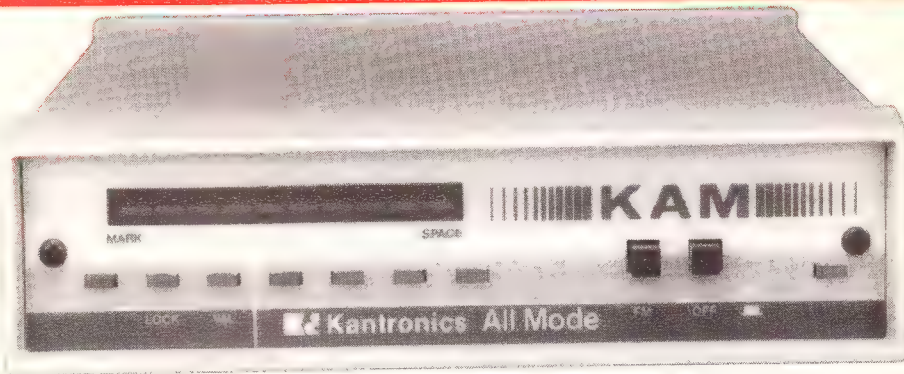
### Two Radio Ports, Two Modems.

The KAM has two radio ports, one especially for HF modes and one for VHF packet. Both ports can be used simultaneously, allowing you to operate packet from both ports at the same time, or provide a packet gateway between the two ports. If you are using the HF port for a mode other than packet, your VHF port can still be operational with your packet mailbox, digipeater, and KA-Node functions. If you are using a Host Mode terminal programme, you can simultaneously work VHF packet and any HF mode. Amtor users have access to the same mailbox as VHF packet users.

### Modes.

The VHF port is used for 1200 baud packet, and reception of weather facsimile (WEFAX) when used with an HF radio.

The HF port supports 50 - 300 baud packet; 20 - 500 baud RTTY/ASCII; Amtor Mode A (ARQ) and Mode B (FEC or SELFEC), both CCIR 476 and 625 recommendations; Navtex/Amtext message formats; preprogrammed 170, 425 and 850 Hz shifts, plus user definable mark and space tones; and 5 - 99 words per minute CW.



The KAM also supports a personal packet mailbox accessible from both ports and from Amtor as well as Packet modes. KISS mode for high level protocols such as TCP/IP works in multi-drop mode. Host mode for enhanced terminal programmes. KA-Node (similar to Net/Rom) for links which are more reliable than digipeating. You can also set up a Gateway or KA-Node between the two ports.

- ★ Software Carrier Detect – run open squelch and detect weaker signals.
- ★ Full duplex capability on VHF port
- ★ Large bargraph tuning indicator for easy HF tuning.
- ★ AMTOR – provides for 7 or 9 char SELCALLS, relinking, and compatibility with 4 character operation.
- ★ CW – Selectable bandwidth and centre frequency
- ★ NAVTEX / AMTEX – Using AMTEX mode you can copy ARRL bulletins.
- ★ RTTY/ASCII – User definable mark and space tones.
- ★ Personal Packet and Amtor Mailbox (PBBS) features: programmable size, reverse

forwarding, TO field editing, mail-waiting indicator

- ★ Automatically transfer connects to PBBS
- ★ Host Mode support for simultaneous VHF packet and any HF mode
- ★ Weather Facsimile (WEFAX) reception with optional computer programme.
- ★ 32K RAM
- ★ Reliable, fast acting AGC eliminates the need for a manual threshold adjustment
- ★ Size: 45 x 150 x 225mm, 1.2kg
- ★ Requires 12 VDC at < 300 mA

### Options

- ★ SmartWatch – Stores PBBS messages, Navtex message numbers, and keeps date and time when unit is turned off (requires low power static RAM).
- ★ Terminal and Wefax programmes for PC compatibles, Macintosh and Commodore C64/128.
- ★ Host Master terminal programmes provide capability to simultaneously work VHF packet and any HF mode (for PC, C64 or Macintosh).

## Host Master II plus

Simultaneous Multi-Mode Terminal Programme for the IBM-PC and compatibles

The Host MasterII plus terminal programme provides a great way to carry on a packet conversation (or several conversations) monitor what else is happening on the channel while keeping everything separate. Plus, with the KAM, work any HF mode at the same time.

The Monitor window will display incoming packets allowed by the TNC monitor commands. The Packet Receive window is actually many windows on top of each other, one for each stream, and a command window. Just use the PgUp and PgDn keys to go to the next channel (window), or use ESC to go to the command window.

The XmitEcho window shows characters as they are transmitted by an HF mode. What you receive from a mode other than packet, such as RTTY, ASCII, AMTOR FEC or ARQ, displays in the Non-Packet Receive Window.

- ✓ Menu driven from keyboard or mouse.
- ✓ 10 buffers, each sent with single keystroke.
- ✓ Replay last line typed on each channel.
- ✓ Scroll back through data in Monitor and Receive windows.
- ✓ Supports standard text mode on all monitors (plus 43 line support for EGA, 43 and 50 line support for VGA).
- ✓ Upload and Down load ASCII files. Each window can be capturing to its own separate file.
- ✓ Edit and save Receive Scrollback buffers.
- ✓ Character Translations supported separately for transmit and receive.

### Menu Bar

1 2 Disc Config File/Edit Term Windows Help Exit

### Monitor Window

Monitors packets according to the settings of TNC monitor commands

### Packet Receive Window

Page through multiple windows, each connected stream has its own window plus a command window

Xmit Echo (displays as you transmit on HF)

### Non-Packet Receive Window

Displays RTTY/ASCII, AMTOR, CW, etc.

### Status Bar

### Transmit Window

Displays what you type on the keyboard

(P1) WD0EMR>KA5ZTX:<<rt5>>:  
(P1) W0XI>CQ:<UI>:

good to meet you  
weather is sunny and warm  
using KAM and Host Master software

WK5M WK5M

RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY  
CQ CQ CQ DE WK5M WK5M WK5M

Channel:1 Port:1 Stream:A \*\*\*CONNECTED TO WD0EMR  
P2:RTTY Sp:45 Sh:170 Transmit Keyb:HFV

WK5M WK5M WK5M DE KA5ZTX KA5ZTX KA5ZTX

- ✓ Supports mouse, printer, Com1, Com2, Com3, and Com4
- ✓ Text Editor built-in, with cut and paste capability
- ✓ Pacterm terminal programme is also on disk. This is a simple programme that does not require Host Mode.

\* Requires Kantronics Host Mode (Available in all Kantronics TNCs with current firmware. Simultaneous multi-mode support for KAM requires firmware version 4.0 or 5.0)

## \$95

Stock No.  
ML060  
inc tax Freight \$12

NEW NEW NEW NEW NEW NEW Kantronics Host mode software NEW NEW NEW NEW NEW NEW

## Hostmaster-MAC

For Apple Macintosh users — now you can join the wonderful world of dual port data operation with Hostmaster-MAC, offering all the features of the IBM-PC version and fully compatible with System 7 (or System 6).

Stock # ML072

## \$95

Freight \$12

Still using a Commodore-64? Thought everybody had forgotten you? Well Kantronics has released an all-new software package for Commodore-64 users that has most of the features of the Hostmaster package for the IBM-PC. So why not step up to the world of dual port data operation, but without casting aside your trusty Commodore!

Stock # ML071

## \$75

Freight \$12



## SOFTWARE

MFJ software supports the features of the MFJ digital data controllers on a range of computers:

- MFJ1284\*** Basic pack for IBM-PC. All basic features but no grey scale FAX or SSTV. **\$49.95**
- MFJ1287** Starter pack for Apple Mac. Basic features, no grey scale operation, but has FAX. **\$49.95**
- MFJ1282B** MULTICOM for Commodore C64/128. Latest version with lots of new features. **\$79.95**
- MFJ1283** Basic pack (tape) for VIC-20. A simple terminal programme. **\$49.95**
- MFJ1288\*** Packet picture software. Supplied with MFJ controllers but can be used with any packet hardware for packet pictures. **\$29.95**
- MFJ1290** MultiCom for Commodore Amiga, fully featured all mode software. **\$79.95**

All packages include manual, MFJ1282,3,4,7 & 9 include cable to connect controller to computer and appropriate disk(s) or tape.

## MFJ EasyDX Log & terminal programme

This impressive little programme allows you to not only totally automate your log keeping, keep track of how you are going for your DXCC, produce QSL card labels and a host of other things, but also allows you to stay in touch with your local DX-Cluster or your mates on Packet.

Very easy to get going, very easy to use.

- Interfaces to Packet Cluster
- Full featured DXCC and general log.
- Prints QSL card labels
- Prints DXCC summaries.
- Built-in packet terminal window

For IBM-PC or compatibles with 512K RAM, preferably with colour display and hard disk.

**MFJ1281** (5.25" disk) **\$62.95**

\* IBM-PC versions are available on 3.5" disks, add M to part number.

# MFJ Multi-Com

- Supports **Multi-Grey** level FAX & SSTV on MFJ1278
- Easy mode change menu
- On line help
- One key macros make a single keystroke do the work of many.
- **Call-Alert™** sounds when specified sequence received.
- Built-in **MultiWord™** word processor for easy message preparation.
- **Packet picture** passing for high resolution image transfer of brilliant colour pictures.
- Easy recall of digipeater or node paths with **Auto-Router™** function, no need to retype every time!
- Supports all nine modes of the MFJ1278 data controller.
- More modes, more features and more performance for the MFJ1278 with IBM-PC. Requires XT/AT compatible, 512K, supports CGA, EGA, VGA. Copy protection used may not work with all hard disk systems.



A picture transferred using the Packet Picture facility in MFJ MultiCom. The original, in full colour is supplied on the disks. Display of this image requires VGA display adaptor.

**MFJ1289** 5.25" disks  
**MFJ1289M** 3.5" disks

**\$95.00**

## MIC/TNC SWITCH

Make life even easier, use the MFJ1272B Microphone / TNC switch with any radio using a standard 8 pin microphone plug. Suits ICOM, Kenwood, Yaesu & others.



**MFJ1272B** suits MFJ TNCs **\$76.80**

**MFJ1272BX** suits AEA PK-232 **\$87.90**

**MFJ1272BY** suits Kantronics KAM **\$87.90**

## CABLES

MFJ & Stewart Electronics now supply a range of cables, pre-assembled for popular radios:

**MFJ5024** ICOM/Yaesu HT **\$32.90**

**MFJ5026** Kenwood HT except 2500 **\$32.90**

**MFJ5080** Yaesu 8 pin rigs **\$32.90**

**MFJ5084** ICOM 8 pin rig **\$32.90**

**MFJ5086** Kenwood/Alinco 8 pin **\$32.90**

## 12V DC Plug-pack for TNCs

Suits all MFJ and other TNCs — a DC supply is not included in the price of any of our TNCs.

**MFJ1315X** **\$18.50**

## Plug into packet the easy way with...

# DRSI PC\*Packet adaptors

Two of the greatest names in packet radio come together to bring you the elegantly simple yet simply sophisticated solution for the IBM-PC or clone owner. Digital Radio Systems Inc. is one of the well established names of the packet world and Stewart Electronics in Australia has cemented its reputation by providing a combination of products, support and service second to none.

### Simple and Easy,

No, there is no other way to describe the DRSI PC\*Packet adaptor. Just plug in the PC\*Packet adaptor and away you go. No separate box to mess up the shack, no software that might be difficult to use, no awkward to learn commands to remember. Even better, the DRSI PC\*Packet adaptor does not occupy one of your valuable COM port addresses so you can still have a mouse and telephone modem attached at the same time you use packet radio. Even better, once the software is installed you can leave your packet system running while you use your PC for other tasks.

### yet Sophisticated...

Once you have mastered a few simple to learn, menu driven, commands you are ready to use the PC\*Packet adaptor for simultaneous multiple connect dual band HF/VHF or VHF/UHF packet operation. You can also explore the world of BBS operation and the Amateur InterNET (TCP/IP) without spending another dollar! The DRSI PC\*Packet adaptors also offer 2400 baud operation or even higher speeds, great opportunities for experimentation and even an easy path to packet software development with the software developers kit.

### Software Included

Unlike other packet radio products all the software you need to run the DRSI PC\*Packet adaptor is right in the box when you open it, four disks full of it! The THS terminal programme has all the latest features as well as many not found on other products, hot key help and menus, split screen multi-connect operation, YAPP file transfer and great flexibility. Also supplied are the AA4RE BBS package, TCP/IP and the G8BPQ packet switch software. All the extras you will ever need.

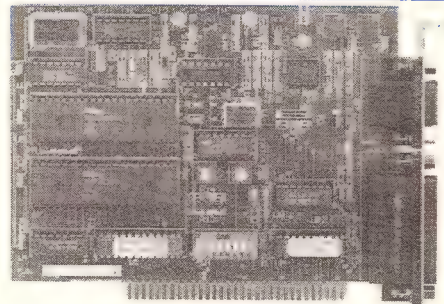
DRSI PC\*Packet adaptors are also suited to large BBS operations. Up to four cards can give eight radio ports for a total of 128 simultaneous connections.

### HF Modem

For use with type 1 or type 3 cards the DRSI HF modem offers superior performance. Power is derived from the PC\*Packet adaptor but the modem can be placed with the HF radio for ease of tuning and use. DRSI has chosen PLL demodulator technology to give you the best possible HF performance rather than compromising with filter type RTTY demodulators that some manufacturers persist with!

**Stock# ML009** DRSI HF modem **\$171**

All DRSI PC\*Packet adaptors have two separate output ports allowing them to use one or two radios. The three types differ in the configuration of the modems on the card and those supported externally.

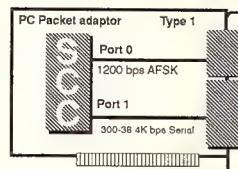


### PC\*Packet adaptor Type 1.

The basic type with one on board 1200 bps AFSK modem for VHF/UHF use and provision for one external modem. The second port can be connected to an HF modem or a high speed modem. Optional DCD card can be fitted.

**Stock# ML004**

**\$299**

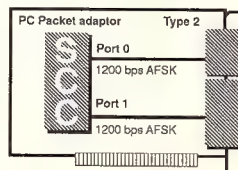


### PC\*Packet adaptor Type 2.

The Type 2 adaptor has two 1200 bps modems for BBS and more sophisticated applications. Like all PC\*Packet adaptors the modems provide crystal controlled stability. Both ports may have DCD cards fitted.

**Stock# ML005**

**\$363**

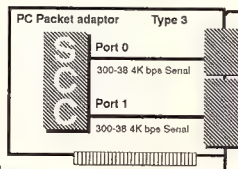


### PC\*Packet adaptor Type 3.

For more unusual applications this adaptor uses two external modems for dual frequency HF or high speed VHF/UHF applications.

**Stock# ML007**

**\$299**



### DCD State machine

For improved operation with receiver mute open the optional DCD state machine card can be fitted to 1200 bps modem ports.

**Stock # ML103**

**\$68.40**



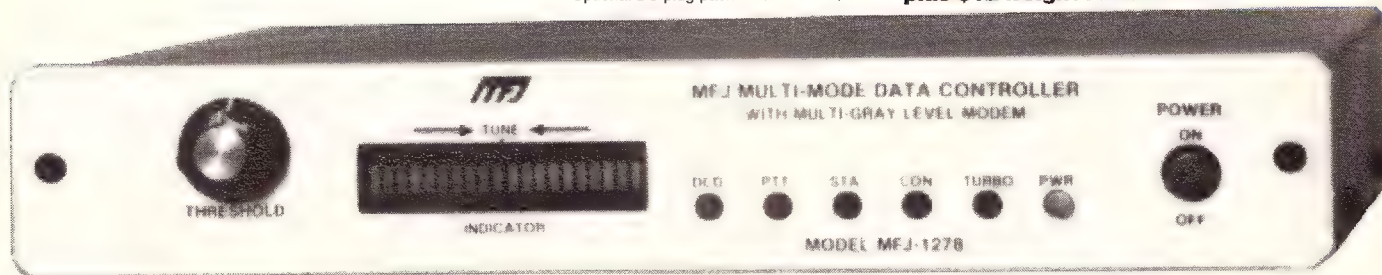
# The multi-talented multi-mode MFJ

While others offer you four year old technology and missing features the MFJ1278 offers quality, support and features, including 9 digital modes at affordable prices for every amateur.

# \$555.00

Inc. tax

Optional DC plug-pack MFJ1315X \$18.50 plus \$12 freight in Australia.



With features like hand held PTT keying, easily adjusted audio levels, flexible signal input facilities, and separate radio connectors why would you want to look past the MFJ1278 Multi-mode data controller?

Look at the modes you get:

- ① HF & VHF packet
- ② AMTOR
- ③ HF & VHF Baudot RTTY
- ④ HF & VHF ASCII RTTY
- ⑤ CW and MCW
- ⑥ FAX
- ⑦ SSTV
- ⑧ Navtex
- ⑨ Contest memory keyer

NOTE: DC power supply is not included in price

- High performance modem circuitry with true DCD for HF, giving the most reliable operation in tests conducted by *Packet Radio Magazine*.
- Exclusive built-in printer port. Only the MFJ1278 has a dedicated printer port. You don't need a special cable to connect your printer.
- Easy-Mail™ mail box with soft partitioned memory so you and your friends can exchange messages any time you like. No need to leave your computer running.
- Precision 20 LED tuning indicator makes the MFJ1278 the easiest multi-mode controller to tune accurately on HF.
- Multi-grey level FAX & SSTV modem so you can look at SSTV pictures in 8.5, 12, 17, 24 & 36 second formats and FAX pictures from the likes of AAP and other news agencies for tomorrow's news today!
- Transmit FAX images in black & white or grey scale WITHOUT MODIFICATION! (Fax & SSTV modes require special optional software)

- Receives 170, 425 & 850Hz shift RTTY signals.
- Check your CW skills with random CW generator
- One FREE upgrade! When you buy your MFJ1278 you receive a coupon valid for one free upgrade of your multi-mode data controller so you don't need to worry about the cost of adding new modes as they become available.
- 32K RAM
- Requires 12V DC @ 400mA
- KISS interface for TCP/IP and BBS applications.
- Independent audio level adjustment for both radio ports.
- Lithium battery back-up easily replaced (lasts approx 2 years).
- Fully socketed ICs for easy maintenance.
- Backed by MFJ and Stewart Electronics with the 'No Matter What'™ 12 month guarantee, designed to keep you on the air.

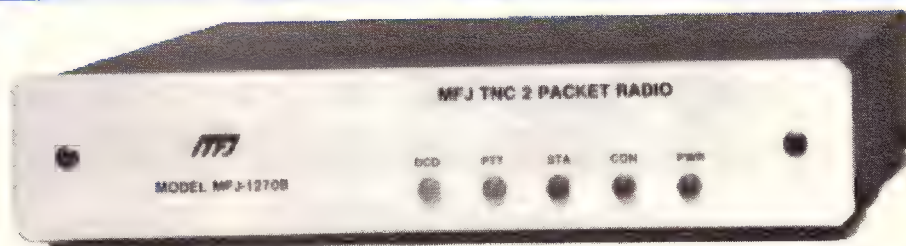
## MFJ HF/VHF Packet Radio controllers

Thousands of these robust, basic TNCs are in use all around the world by individual amateurs as well as in digipeaters and bulletin board systems. You get the full TAPR TNC-2 with many MFJ exclusive enhancements which combine to give the MFJ1270B and MFJ1274 the reputation of being the most reliable TNCs in the world today.

When you want to go beyond the basics you have what is regarded as the most reliable KISS implementation as well as MFJ Host Mode, MFJ's priority acknowledgement technology to reduce collisions and many other enhancements.

Designed to operate from 12V DC (power supply not included) the MFJ TNCs have RS-232 and TTL serial (for Commodore 64) interfaces as well as software to support IBM-PCs, Apple MACs and Commodore C64 and 128.

Along with all this you get MFJ's no-nonsense 12 month warranty and low cost update policy, great value — in fact the best packet value in town!



**MFJ1270B** (VHF/UHF pictured)

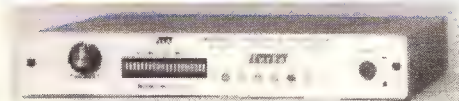
Optional DC plug-pack MFJ1315X \$18.50

**MFJ1274** (HF/VHF w tuning indicator)

# \$269

# \$299

### HIGH SPEED OPTIONS



All MFJ controllers are available with the MFJ2400 TURBO modem fitted for easy operation of 2400 bps packet. To save yourself the inconvenience of fitting the option card yourself you can order the controller factory modified with the TURBO option fitted by using the following model numbers.

MFJ1278T 2400 bps MFJ1278 **\$705**  
 MFJ1270BT 2400 bps MFJ1270B **\$366**  
 MFJ1274T 2400 bps MFJ1274 **\$399**

Any MFJ digital data controller, and most types from other manufacturers, can be fitted with the MFJ2400 2400 bps QPSK modem. Compatible with most radios used for 1200bps operation MFJ2400 upgrades can be used in controllers which have standard modem disconnect headers.

MFJ2400 2400bps for MFJ TNC's **\$170**

A special version of the 2400 bps modem for the AEA PK-232 and PK-232MBX multi-mode controllers.

MFJ2400X 2400bps for PK-232 **\$170**

The MFJ9600 is a 9600bps modem compatible with the G3RUH design and compatible with the 9600 baud products manufactured by PacComm and Kantronics.

MFJ9600 9600bps modem card only **\$199**

Note: Not all radios are compatible with 9600 baud operation.

### MAILBOX UPGRADES

All current model MFJ TNCs can have either 32K, 128K or 512K mailbox expansion RAM fitted. These modification kits include all necessary parts and instructions with new firmware EPROMs.

MFJ46 32k expansion kit **\$109.90**  
 MFJ46B 128k expansion kit **\$153.90**  
 MFJ46C 512k expansion kit **\$439.90**

**MFJ is represented exclusively in Australia by Stewart Electronics!**





With the **NEW MFJ1214** you will be able to use your radio to receive and transmit brilliant, full colour news photographs, incredible WeFAX maps and RTTY. With easy to use menu driven software, comprehensive manuals and the now famous MFJ JumpStart guide you will be enjoying your radio even more than ever!

The MFJ1214 is a combination software and hardware package for specific computers. Presently, versions are available for the IBM-PC and compatibles and the Commodore AMIGA. It is hoped that versions for the Macintosh and other computers will be available soon. Everything you need is included; you don't need to buy any other software to get going and the only hardware you need is a connector to suit your radio.

You will enjoy RTTY, including news broadcasts, ASCII, WeFAX for weather maps and FAX for all sorts of news service photographs as well as amateur radio operators sending FAX images to each other.

## FAX, WeFAX, RTTY & CW with simplicity!

The MFJ1214 offers 16 levels of grey scale for really top quality FAX and WeFAX images. There is even a built-in timer function allowing you to begin automatic reception of weather maps, which can then be saved to disk automatically, printed on your printer or both if you wish.

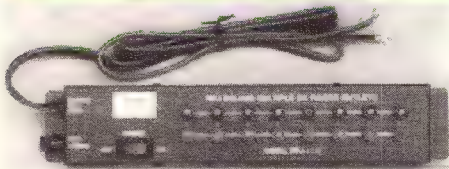
**VERSATILE ZOOM FEATURE** allows the selection and enlargement of areas of the images for close inspection of detail.

- ☆ 16 level grey scale
- ☆ Full colour FAX photos
- ☆ RTTY with on screen tuning indicator
- ☆ RTTY text editor built-in
- ☆ Save text or images to disk or display them — your choice!
- ☆ CW regeneration for cleaner signals
- ☆ CW keyboard mode for effortless CW sending
- ☆ Software and cables included for either IBM-PC or Amiga computers.

**MFJ1214PC** for IBM-PC **\$316.00**

**MFJ1214AM** for Amiga **\$316.00**

## DC Multiple outlet boxes



**MFJ1116** - Eight pairs of binding posts with switch, fuse and Ammeter. **\$98.90**  
Every shack needs one!



**MFJ1112** - Six pairs of binding posts for general purpose 12V distribution. RF bypassing fitted to keep your DC lines clean. **\$65.90**

## SPEAKER MICROPHONES

### Compact Size

MFJ's speaker microphone lets you carry your hand held safely on your belt yet still monitor and talk with convenience. These microphones have quality electret inserts and wide range speakers for superb audio on both transmit and receive.

Earphone jack is provided on plug.

**MFJ283** Alinco (split jacks) **\$54.00**  
**MFJ284** Icom or Yaesu **\$54.00**  
**MFJ286** Kenwood **\$54.00**

### Tiny size

MFJ's Tiny-sized speaker microphones give you all the features in a tiny package. High quality electret inserts and wide range speakers give superb audio quality. Each mike has an earphone jack on the microphone, an indicator LED for PTT and a swivelling lapel/pocket clip and MFJ's unconditional one year warranty in a package only 50 x 32 x 6.5mm!

**MFJ285** Icom, Yaesu, Alinco **\$54.00**  
**MFJ285W** W2A & SRA series Icom **\$54.00**  
**MFJ285L** with right angle connector **\$54.00**  
**MFJ287** Kenwood **\$54.00**  
**MFJ287L** with right angle connector **\$54.00**

## Outdoor Active Antenna



The **MFJ1024** is an active receiving antenna designed for use out of doors. Mounted away from sources of electrical noise the MFJ1024 offers the opportunity for reception of signals in the range 50kHz to 30MHz where other types of antennas are just not practical.

"World Radio TV Handbook" says the MFJ1024 is a "first rate easy to operate active antenna... quiet... excellent dynamic range... good gain... very low noise factor... broad frequency coverage... an excellent choice." The indoor control unit has a 20dB attenuator and adjustable gain to reduce receiver overload. A receiver switch to select between two receivers and an antenna switch to select either the active outdoor antenna unit or an auxiliary antenna system of some other type. Measures 150 x 75 x 125mm.

The remote unit has the 1370mm whip attached to the amplifier box which is supplied with a mounting plate and hardware to suit most situations. Fifty feet of RG58 coax with the appropriate plug fitted is supplied connected to the unit. Just hook it up and go! Requires 12V DC supply (not supplied)

**MFJ1024** Outdoor active antenna

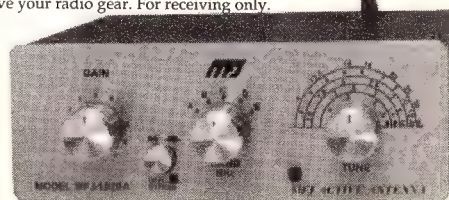
**\$285**

## Indoor Active Antenna

Put this handsome unit on your operating desk and listen to the world! Its performance can rival, even exceed, an external long wire hundreds of feet long. Tuned circuitry minimises intermodulation, provides additional RF selectivity and reduces the effects of noise from outside the band you have tuned. Inbuilt RF amplifier lets you use the MFJ1020A as a preselector with an external aerial. Covers the frequency range 300kHz to 30MHz. "World Radio TV Handbook" says the MFJ1020 is "fine value... fair price... best offering to date... performs very well indeed." Tune, Band, Gain, On/Off & Bypass controls. Operates from 9V battery (not supplied) or external 9-18V DC supply. 127 x 50 x 150mm plus telescoping whip.

The attractive black aluminium cabinet has a brushed front panel which will look at home where ever you have your radio gear. For receiving only.

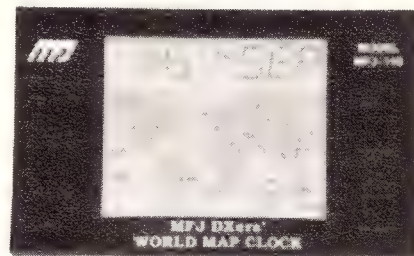
**MFJ1020A**  
Indoor active antenna  
**\$175.90**



## CLOCKS

**MFJ110** - World time clock - See the time anywhere in the world at a glance. This attractive clock not only shows you the time but also has a world map so you can see where you are talking to.

Easy push button operation lets you move the display to a QTH in every time zone. Recall feature instantly moves back to local time. Great gift idea!



**MFJ110** **\$53.90**

## 12/24 Hour clocks

Read both UTC and local time with the convenient **MFJ108B** dual time clock. One unit is 24 hour for UTC, the other 12 hour for local time. Or you can choose the **MFJ107B** single 24 hour clock.



Mounted in a brushed aluminium frame these clocks feature huge 16mm characters, long life battery included.

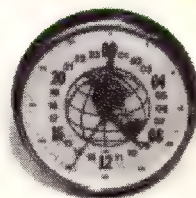


**MFJ107B** (single clock) **\$21.00**

**MFJ108B** (dual clock) **\$44.00**

## NI8F 24 hour Clock

This stylish 150mm diameter clock has an easy to read 24 hr. clock face and is mounted on a black gloss plastic back. A high quality movement is complemented by a 2 year limited warranty.



**MT3038** NI8F 150mm clock **\$79.80**



From the basic 2-23 to the revolutionary 2-70G, rf concepts provides a range of amplifiers of exceptional quality for every amateur application. The 70cm types are all ATV compatible.

Model	2-23	2-117	2-217	2-317	2-417	4-32	4-110	4-310	2-70G	
Frequency	144-148					430-450			144-148	430-450
Power IN	2	2	10	30	45	3	10	30	5	5
Power OUT	30	170	170	170	170	20	100	100	30	20
Pre-amp NF (dB)	1-2	1-2	1-2	1-2	1-2	2-3	2-3	2-3	1-3	2-4
Current (typ)	5A	25A	25A	22A	22A	4A	22A	20A	6A	
Size (mm)	165x90x50	292x150x75				165x90x50	292x150x75		89x50x203	
Price	\$269	\$661	\$661	\$661	\$661	\$368	\$766	\$709	\$534	



## Mirage/KLM VHF/UHF Power amplifiers

# MIRAGE /KLM

Built with the same attention to detail and the same attitude to quality as Mirage/KLM antennas this range of power amplifiers includes some absolute bruisers! One look at the list will tell you what I mean!



Model	A1015G	A1530G	A1560G	B23G	B215G	B108G	B1016G	B3016G	B3030G	D15N	D26N	D1010N	D3010N
Frequency MHz	50-54			144-148						420-450			
Power IN	10	10	25	2	2	10	10	30	30	2	2	10	30
Power OUT	150	350	600	30	150	80	160	160	300	20	60	100	100
Current	18-22A	22A@24V		5A	20-25A	10-12A	20-25A	20-25A	48	3A	12A	20A	20A
Size	300x75x140			100x50x114	300x75x140				250x300x125	190x89x50	210x64x178	305x75x140	
Weight	2.8	2.8		.5	2.8	1.4	2.8		6.8	.7	1.8	2.8	
Price	\$640	\$982		\$289	\$591	\$365	\$591	\$532	\$1108	\$322	\$479	\$678	\$630

## RF Wattmeters



The Mirage/KLM MP series wattmeters cover all amateur bands up to 1300MHz and offer:

- ❖ Remote coupler mounting
- ❖ Peak or average reading
- ❖ No charts or graphs needed
- ❖ 5 year warranty
- ❖ Quality meter movement
- ❖ Operates on 9-13.8V DC

MP-1 1.8-30MHz 2kW

\$367

MP-2 50-200MHz 1.5kW

\$367

MP-3 420-450MHz 150W

\$412

MP-4 1260-1300MHz 100W

\$437



A complete range of baluns for HF, VHF and UHF use rated up to 10kW is available from Mirage/KLM. Many are kept in stock in Melbourne. Please enquire for details

## GaAsFET VHF & UHF Preamplifiers

These new preamplifiers from Mirage/KLM use the latest in GaAs-FET technology to provide every keen VHF/UHF amateur with a line of high quality amplifiers for use indoors or at the mast-head. Even better, they can be controlled and powered by radios such as the ICOM IC-271/471 & 275/475/575 which have internal preamp power supply and control facilities.

- Automatic RF switching
- GaAs-FET for best performance
- In-line design for ease of operation
- Switchable gain settings
- Gain of >20dB
- Noise figure < 0.6dB
- Power handling 160W
- Power - nominal 13.8V DC
- Mast mount (KP2) has DC coupler supplied

KP1/10M 28-30MHz

\$212

KP1/6M 50-54MHz

\$212

KP1/2M 144-148MHz

\$212

KP1/70cm 430-450MHz

\$212

KP2/10M 28-30MHz

\$292

KP2/6M 50-54MHz

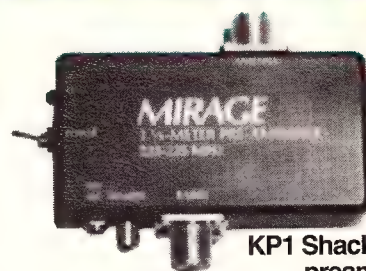
\$292

KP2/2M 144-148MHz

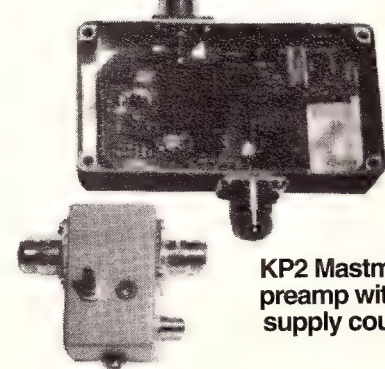
\$292

KP2/70cm 430-450MHz

\$292



KP1 Shackmount preamp



KP2 Mastmount preamp with DC supply coupler.



## HF Vertical and beam antennas

### World Ranger

#### Multiband YAGIs for 10,12,15,17, 20,30 & 40 mtrs

Our three and four element triband beams provide the versatility and performance you need for reliable communications around the world. Cushcraft's World Rangers are made to last with 6063-T832 aluminium tubing, weatherproof traps, stainless steel hardware and fibreglass insulators. They are designed with fewer parts for easier assembly, lower weight and less windload.

The add-on kits shown below can be used to add 30 or 40 metres to the A3S and A4S or 30 metres to the unique WARC band A3WS dual band beam.

Model	A4S	A3S	A3WS
Frequency	28.21,14	28.21,14	24,18
Number of elements	4	3	3
Forward gain, dBd	8.9	8	8
Front to back ratio, dB	16	14	14
Power, watts PEP	2000	2000	2000
Boom length, metres	5.48	4.27	4.27
Longest element, mtrs	9.75	8.45	7.66
Turning radius, mtrs	5.49	4.72	4.4
Max mast size, mm	50	50	50
Wind load, square metres	.51	.47	.38
Weight, kg	16.8	12.3	10.24
Price (inc tax)	<b>\$1043</b>	<b>\$867</b>	<b>\$683</b>

#### World Ranger 30 & 40 mtr add-on kits

Model	A743	A744	A103
Frequency, MHz	7 10	7 10	10
Driven element length	10.72 8.66	10.72 8.66	9.8
Wind load square metres	.05 .03	.05 .03	.05
Bandwidth, kHz	125 150	125 150	250
Power, watts PEP	2000 2000	2000 2000	2000
Weight, kg	1.6 1.05	1.6 1.05	1.5
Price (inc tax)	<b>\$273</b>	<b>\$273</b>	<b>\$273</b>

### ROTATABLE DIPOLES

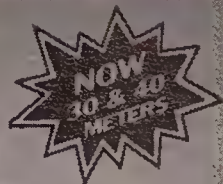
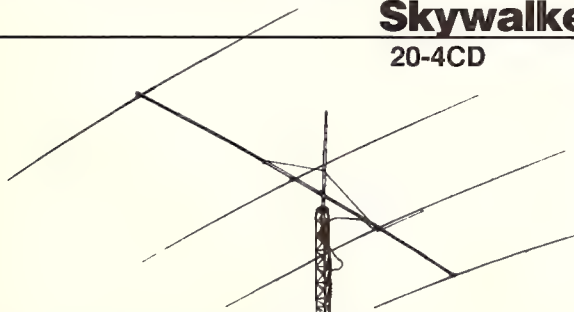


Model	D40	D4	D3	D3W
Frequency	7	28.21,14.7	28.21,14	24,18,10
Bandwidth, kHz	200	>350*	>500	>200
Power, watts PEP	2000	2000	2000	2000
Length, metres	12.88	10.92	7.86	10.37
Wind load, square metres	.12	.12	.08	.08
Weight, kg	5.5	5.9	4.1	5
Price (inc tax)	<b>\$507</b>	<b>\$566</b>	<b>\$419</b>	<b>\$429</b>

Cushcraft rotatable dipoles come in four models, a single bander for 40 metres, three and four banders as well as the new D3W for three WARC bands. Their size means they can be mounted high above trees for better performance than a wire dipole without the worry of a tribander on a tall mast or tower.

## Skywalker Monoband Yagis

### 20-4CD



### Cushcraft R7

### Multiband HF verticals

Half-wave verticals for  
7,10,14,18,21,24,28 MHz

## R5,R7

IT'S THE ONE YOU'VE ASKED FOR! Amateur radio's most popular vertical antenna design now gives you 30 & 40 metres WITH NO GROUND RADIALS! Only 6.9 metres (22.5 feet) tall, the R7's small footprint and ground independence gives you mount anywhere flexibility. Ideal for confined spaces and unobtrusive in home units, the R5 and R7 offer simple assembly (it takes about twenty minutes) automatic frequency selection and only 7 short (1 metre) counterpoise rods mean you worry about DXing, contesting or rag-chewing, not what the neighbours or XYL think!

Convenience is only one reason to own a Cushcraft R5 or R7 vertical, the main reason is performance. The only connection to your rig is a single coax. No band switching, no remote tuning and you can have amateur radio's best performance to size ratio antenna on 30 & 40 metres, a total of SEVEN bands today!

Model	R5	R7
Frequency	28.24,21,18,14	28.24,21,18,14,10,7
Gain, dBi	3	3
Electrical length	Half-wave	Half-wave
SWR 2:1 bandwidth	Full band	Full band
Power, watts PEP	1800	1800
Radiation angle	16°	16°
Height, metres	5.2	6.9
Max mast size, mm	45	45
Wind load, square mtr	.13	.21
Weight, kg	4	5.6
Price (inc tax)	<b>\$620</b>	<b>\$870</b>

## HF Verticals

### 80 - 10 metres

As well as the popular and very successful half-wave verticals the R5 and R7, Cushcraft offers three, five and eight band quarter wave verticals with high quality, heavy duty construction with all stainless steel hardware. These compact antennas are ideal wherever you have the space for ground radials but not for a beam antenna.

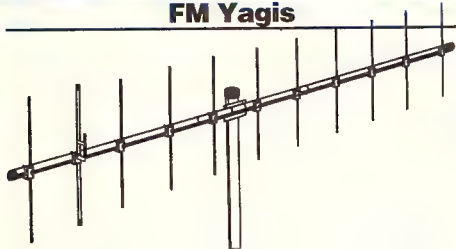
For use with any of these antennas the APR18 radial kit consists of 6 pre-cut radial assemblies with connecting lugs all ready to attach to the base of the antenna.

Model	AV3	AV5	AP8
Frequency	28.21,14	28.21,14,7,3.5	28.24,21,18,14,10,7
Gain, dBi	3	3	3
Electrical length	1/4-wave	1/4-wave	1/4-wave
SWR 2:1 bandwidth	Full band	Full band 80M-70kHz	Full band 40M-150kHz
Power, watts PEP	2000	2000	2000
Radiation angle	18°	18°	18°
Height, metres	4.2	7.4	7.92
Max mast size, mm	42	42	42
Weight, kg	2.3	3.65	4.23
Wind load, square mtr	.10	.19	.14
Radials required	Normally yes.		
Radial kit to suit	APR-18 (set of 6)		
Price (inc tax)	<b>\$205</b>	<b>\$380</b>	<b>\$453</b>

Model	10-4CD	10-3CD	TEN-3	15-4CD	15-3CD	20-4CD	20-3CD	40-2CD
Frequency	28-29.7	28-29.7	21-21.45	21-21.45	21-21.45	14-14.35	14-14.35	7-7.3
Number of elements	4	3	3	4	3	4	3	2
Forward gain, dBd	10	8	8	10	8	10	8	5.5
Front to back ratio, dB	30	30	25	30	30	30	30	20
Power, watts PEP	2000	2000	2000	2000	2000	2000	2000	2000
Boom length, metres	4.88	3.05	2.44	6.10	4.27	9.75	6.1	6.9
Longest element, mtrs	5.34	5.38	5.49	7.11	7.06	11.0	10.96	12.9
Turning radius, mtrs	3.5	3.05	3.0	4.72	4.11	7.2	6.1	7.29
Max mast size, mm	50	50	50	50	50	50	50	50
Wind load, square mtr	.29	.21	.20	.42	.32	.75	.51	.57
Weight, kg	11.4	5	4.5	11.4	9.1	25	13.7	20
Price (inc tax)	<b>\$507</b>	<b>\$390</b>	<b>\$264</b>	<b>\$605</b>	<b>\$517</b>	<b>\$1072</b>	<b>\$750</b>	<b>\$1072</b>



## FM Yagis



VHF FM communications is still the major growth area of amateur radio today. Both for voice and for packet operation, Cushcraft's FM Yagis and Boomer FM Yagis are ideal choices no matter what type of operation you are interested in. High gain, clean radiation patterns, ease of assembly and materials of the highest quality are all part of the story.

Multi-antenna arrays are also part of the story, as are stacking frames and power splitters for virtually the entire range. Please ask for the Cushcraft stacking data sheet for precise details and prices.

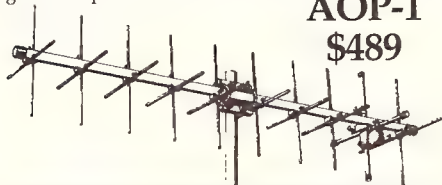
Model	A147-11	A147-22
Frequency, MHz	145.5-148	145.5-148
Number of elements	11	22
Forward gain, dBd	13.2	16.2
Front to back ratio, dB	20	20
Power, watts PEP	800	800
Boom length, metres	3.6	2.1x3.6
Longest element, mtrs	1.02	1.02
Turning radius, mtrs	1.8	2.0
Max mast size, mm	39	39
Wind load, square mtr	.11	.26
Weight, kg	2.73	6.83
Price (inc tax)	<b>\$166</b>	<b>\$458</b>

## Oscar

Here's the system to get you going for amateur satellite operation. The Cushcraft AOP-1 'Oscar Pack' includes the 416TB for 70cm uplink, the A144-20T for 2m downlink, a mounting boom and all the hardware necessary for quick installation.

OSCAR operation will be more fun with the optional remote polarisation switch, PS4, mounted right on the 416TB. You will have access to satellites having either right or left polarisation.

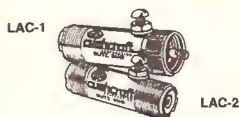
**AOP-1**  
**\$489**



Model	A144-10T	A144-20T	416TB
Frequency	145.9	145.9	435
Number of elements	2x5	2x10	2x8
Forward gain, dBd	10.5	12.2	12.5
Front to back ratio, dB	20	20	20
Power, watts PEP	800	800	800
Boom length, metres	1.8	3.3	2.03
Longest element, mtrs	1.02	1.02	.34
Turning radius, mtrs	1.04	1.78	2.04
Max mast size, mm	39	39	50
Wind load, square mtr	.07	.13	.05
Weight, kg	1.59	3	2.23
Price (inc tax)	<b>\$185</b>	<b>\$263</b>	<b>\$214</b>

## BLITZ BUG LIGHTNING ARRESTERS

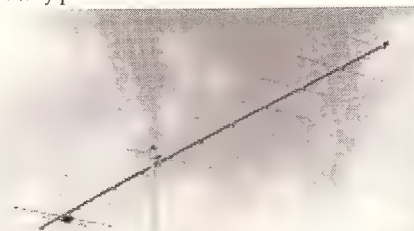
The Cushcraft Blitz Bug arresters use a patented three point static discharge cell design. They have a sealed chamber, constant static drain and controlled discharge. Blitz bugs are rated at 2kW to 500MHz with negligible insertion loss



**LAC1** with UHF plug & UHF socket **\$16.56**  
**LAC2** with UHF sockets **\$20.52**

## Boomer FM, SSB & CW Yagis

The Cushcraft Boomer range represents the state of the art in VHF and UHF Yagis for most uses. Supplied complete with all necessary mounting hardware. The 26B2 is a combination of two 13B2's and a cross boom for vertically polarised FM use.

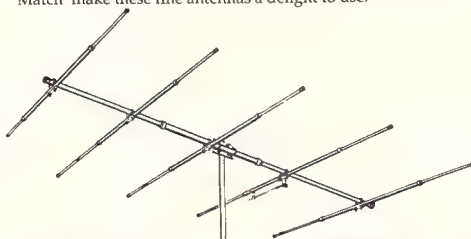


## 13B2

Model	617-6B	124WB	13B2	17B2	26B2	424B
Frequency, MHz	50-51	144-148	144-148	144-145	144-148	424-435
Number of elements	6	4	13	17	26 (Vert)	24
Forward gain, dBd	14	10.2	15.8	18	18.8	18.2
Front to back ratio, dB	30	24	26	26	26	30
Power, watts PEP	2000	2000	2000	2000	2000	2000
Boom length, metres	10.36	1.22	4.57	9.45	4.57	5.3
Longest element, mtrs	2.97	1.04	1.02	1.04	1.02	.34
Turning radius, mtrs	5.39	1.22	2.7	5.26	3.18	3.05
Max mast size, mm	50	50	50	50	50	50
Wind load, square mtr	.45	.034	.17	.38	.17	.21
Weight, kg	11.83	1.36	3.1	7.19	3.05	2.05
Price (inc tax)	<b>\$731</b>	<b>\$126</b>	<b>\$253</b>	<b>\$429</b>	<b>\$702</b>	<b>\$283</b>

## Sideband Yagis

The performance of these budget antennas will surprise you! They are light weight, durable and easy enough to assemble that you will be on air in an afternoon. Good bandwidth, tapered elements and direct 50Ω matching with the Cushcraft 'Reddi-Match' make these fine antennas a delight to use.



Model	A50-3	A50-5S	A50-6S	A144-7	A144-11	A430-11
Frequency, MHz	50-54	50-54	50-54	144-146	144-146	430-435
Number of elements	3	5	6	7	11	11
Forward gain, dBd	8	10.5	11.2	11.1	13.2	13.2
Front to back ratio, dB	20	22	24	20	20	20
Power, watts PEP	1000	1000	1000	1000	1000	1000
Boom length, metres	1.8	3.7	6.1	2.5	3.7	1.4
Longest element, mtrs	3.0	3.0	3.0	1.00	1.0	.35
Turning radius, mtrs	1.8	2.3	3.4	1.5	2.0	.81
Max mast size, mm	50	50	50	39	39	39
Wind load, square mtr	.17	.25	.41	.08	.11	.04
Weight, kg	3.19	5	9.2	1.82	2.73	1.4
Price (inc tax)	<b>\$221</b>	<b>\$365</b>	<b>\$444</b>	<b>\$92</b>	<b>\$159</b>	<b>\$115</b>

## Lightning arresters

### Gas Discharge lightning arresters

Protect your valuable equipment from lightning induced surges of up to 5000 amperes with a Cushcraft constant impedance gas discharge lightning arrester! The LAC4 series have replaceable gas tubes which clamp surges to about 50V in about 100 nanoseconds, much quicker than the voltage rise time of lightning pulses.



**LAC4** 200 watt with UHF connectors **\$70.80**  
**LAC4H** 2kW with UHF connectors **\$75.00**  
**LAC4N** 200 watt with N connectors **\$82.00**  
**LAC4NH** 2kW with N connectors **\$89.00**  
**LC2** 200 watt replacement cartridge **\$28.62**  
**LC2KW** 2kW replacement cartridge **\$32.52**

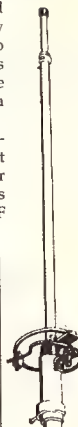
## Ringo verticals

### 10, 6, 2 metres & 70cm

If you need a combination of compact size and low weight in a vertical antenna that also offers low radiation angle and wide bandwidth then look no further! The Cushcraft Ringo antenna family offers unequalled variety with high quality and affordable prices. In fact a genuine Ringo is so good it makes a 'Dingo' look like a real dog!

The basic Ringo family are 1/2 wavelength designs which have the antenna connected to the mast for DC and so have inbuilt lightning protection. Nor do they build up static charge like many other designs to interfere with your enjoyment of the amateur VHF and UHF bands.

Model	AR-10	AR-6	AR-2	AR-45
Frequency, MHz	28-29.7	50-54	135-160	430-460
SWR 2:1 Bandwidth, MHz	>1.5	2	10	20
Gain, dB	3.75	3.75	3.75	3.75
Power, watts FM	1000	1000	1000	500
Radiation angle	16°	16°	16°	16°
Height, metres	5.36	3.1	1.2	.43
Max mast size, mm	32	32	32	22
Wind load, square mtr	.16	.03	.02	.01
Weight, kg	1.82	1.14	.68	.46
Price (inc tax)	<b>\$128</b>	<b>\$121</b>	<b>\$83</b>	<b>\$88</b>



Model	ARX-2
Frequency, MHz	135-160
SWR 2:1 Bandwidth, MHz	>6
Gain, dB	4.5
Power, watts FM	1000
Height, metres	2.8
Max mast size, mm	32
Wind load, square mtr	.03
Weight, kg	1.82
Price (inc tax)	<b>\$99</b>

## RINGO RANGER

For that bit of extra gain where space does not permit the installation of decoupling radials for an antenna such as the ARX2B then the ARX2 is for you.

## RINGO RANGER II

Cushcraft's Ringo Ranger II has more gain, less wind load and greater mechanical integrity than other two metre antennas. You will readily appreciate the benefits of this amazing antenna! The Ringo Ranger II has built-in lightning protection, UV stabilised insulators, heavy duty heavy wall tubing, improved decoupling radials to prevent feed line radiation and all weather performance only available in antennas costing many times more. It's the performer - over 500,000 have been sold world wide!

Model	ARX2B	ARX450B
Frequency, MHz	135-160	435-450
SWR 2:1 Bandwidth, MHz	>3	>10
Gain, dB	7	11
Power, watts FM	1000	1000
Radiation angle	7°	7°
Height, metres	4.3	1.5
Max mast size, mm	32	32
Wind load, square mtr	.05	.02
Weight, kg	2.73	.5
Price (inc tax)	<b>\$118</b>	<b>\$114</b>

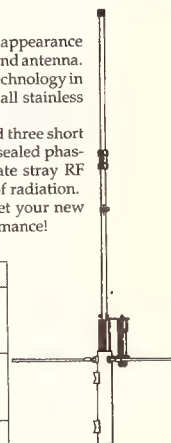
## DUAL BAND RINGO

Experience the performance and appearance advantages of an all-aluminium dual band antenna. The AR270 incorporates Ringo Ranger technology in a lightweight and durable design with all stainless steel hardware.

Its two section vertical element and three short radials is easy to install anywhere. The sealed phasing coil and matching network eliminate stray RF currents while providing a low angle of radiation.

A single coax is all you need to get your new dual band rig working to its full performance!

Model	AR270
Frequency, MHz	144-148 435-450
SWR 2:1 Bandwidth, MHz	>4 >15
Gain, dB	3.7 5.5
Power, watts FM	250 250
Height, metres	1.13
Max mast size, mm	50
Wind load, square mtr	.03
Weight, kg	.91
Price (inc tax)	<b>\$145</b>





# MIRAGE /KLM

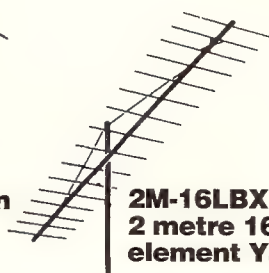
## VHF & UHF ANTENNAS

**From one of the world's great antenna manufacturers, just for you!**

Every KLM antenna is designed with the amateur in mind, but with no sacrifice of quality! Made from only the best weather resistant materials, Lexan insulators and all stainless steel hardware these antennas are quite possibly the best you can buy, but they also have a price tag to match. The entire range is shown on these pages. Many types are held in our warehouse for immediate delivery. Others are usually available within 4 to 6 weeks from the USA. So whatever your interests try KLM and enjoy!



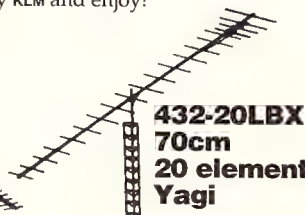
**6M-7LB**  
6 metre  
long boom  
Yagi



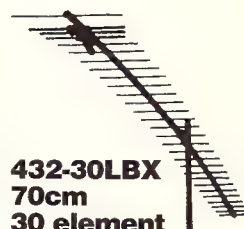
**2M-16LBX**  
2 metre 16  
element Yagi



**440-16X**  
70cm  
16 element  
Yagi



**432-20LBX**  
70cm  
20 element  
Yagi

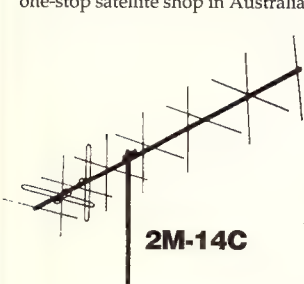


**432-30LBX**  
70cm  
30 element  
Yagi

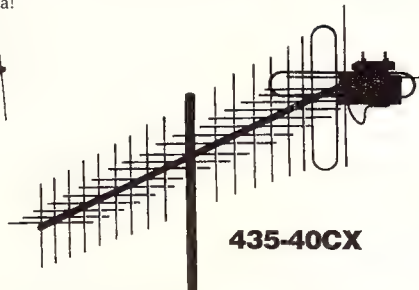
Model	6M-5	6M-7LD	6M-7LB	6M-10	6M-14	2M-4X	2M-8	2M-11X	2M-13LBA	2M-16LBX	440-6X	440-10X	440-16X	432-20LBX	432-30LBX
Bandwidth MHz	50-52	50-51	50-52	50-52	50-52	144-148	144-148	144-146	144-148	144-146	420-470	420-470	420-450	425-440	430-440
Gain dBd	9.7	10.5	11.5	11.7	14	8.5	10.3	12.5	13.3	14.5	8	11.5	13.5	15.3	17.3
VSWR	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
F/B ratio dB	30	30	30	26	25	20	30	20	20	20	20	20	20	20	20
Elements	5	7	7	10	14	4	8	11	13	16	6	10	16	20	30
Element length	2.93	3.1	3.1	2.97	2.97	1.02	1.02	1.02	1.02	1.02	.36	.36	.36	.36	.36
Boom size	3.6	6.1	7.85	10.4	18.6	1.28	2.21	4.67	6.55	8.54	.71	1.45	3.66	3.76	6.68
Turn radius	2.29	3.96	4.88	5.95	10.9	1.22	1.22	2.74	3.96	4.7	.74	1.49	1.83	2.13	3.76
Wind load sq-ft	1.7	2.5	3	4.4	10	.25	.65	1.38	1.6	2.44	.2	.53	.74	.9	1.71
Weight	4.1	5.46	10	13.2	33.2	0.91	1.82	2.5	4.1	4.55	0.546	1.8	3.41	2.28	4.1
Mast size	50	50	50	50	50	50	50	50	50	50	40	40	40	40	53
Price	\$474	\$540	\$690	\$987	\$1,370	\$147	\$231	\$198	\$225	\$459	\$129	\$162	\$282	\$342	\$402

## SATELLITE ANTENNAS

Every KLM satellite antenna is supplied with any necessary phasing harness and a remote polarisation switch. Non-conducting fibreglass booms, rotator systems and complete tracking systems are also available. This makes Stewart Electronics your only one-stop satellite shop in Australia!



**2M-14C**

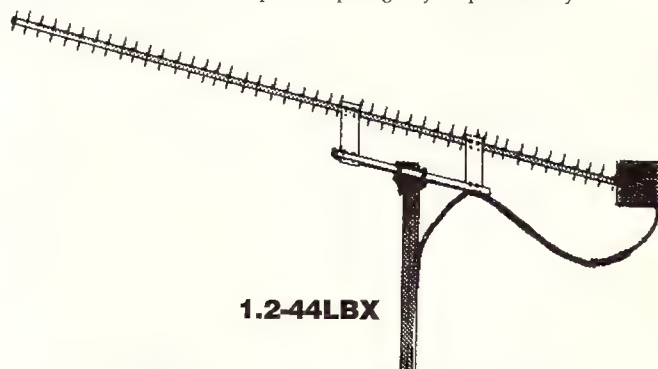


**435-40CX**

Model	2M-14C	2M-22C	435-18C	435-40CX
Bandwidth MHz	144-150	144-148	420-450	420-440
Gain dBdc	11	13	12	15.2
VSWR	1.2:1	1.5:1	1.5:1	1.5:1
F/B ratio dB	20		20	20
Elements	2x7	2x11	2x9	2x20
Element length	1.02	1.02	.36	.36
Boom size	3.89	5.82	2.23	4.45
Turn radius	2.14	3.35	2.14	2.67
Wind load sq-ft	1.25	1.85	.5	1.16
Weight kg	3.41	5	2.05	4.55
Mast size	50	50	40	40
Price	\$384	\$501	\$504	\$588

## 23cm (1.2 GHz) ANTENNAS

The KLM antenna range for 23cm now includes three types. All are supplied completely assembled and pre-tuned at the factory, with the exception of the 44 element version which is in two pieces requiring only simple assembly.



**1.2-44LBX**

Model	1.2-15LBX	1.2-24LBX	1.2-44LBX
Bandwidth MHz	1260-1300	1260-1300	1260-1300
Gain dBd	13.6	16.2	18.2
VSWR	<1.5:1	<1.5:1	<1.5:1
Elements	15	24	44
Element length	.114	.114	.114
Boom size	1.07	1.92	3.76
Turn radius	1.09	.97	2.13
Wind load sq-ft	.25	.5	1
Mast size	50	50	50
Price	\$231	\$279	\$363

**Stewart Electronics is now the ONLY authorised Mirage/KLM distributor in Australia**



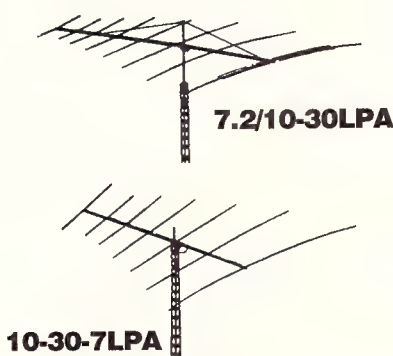
# MIRAGE /KLM

**Triband beams  
HF Monoband Yagis  
HF Log Periodic Arrays**

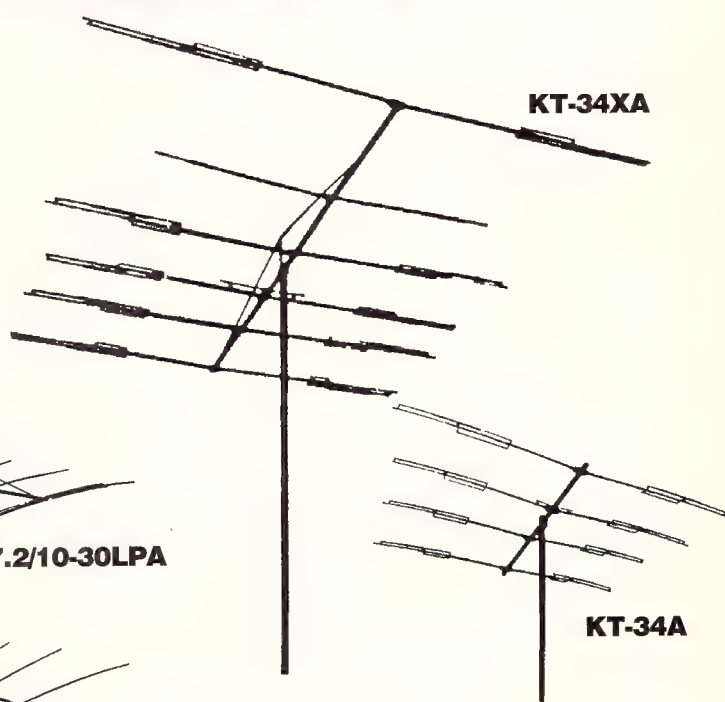
**When the quest is for excellence in antennas  
there can only be one result... and this is it!**

Model	KT-34A			KT-34XA		
Bandwidth MHz	14-14.35	21-21.45	28-29.7	14-14.35	21-21.45	28-29.7
Gain dBd	7	7	7	8.5-9	9-9.5	11-11.3
VSWR	1.5:1			1.5:1		
F/B ratio dB	20			20		
Elements	4			6		
Element length	7.32			7.32		
Boom size	4.87			9.76		
Turn radius	4.87			6.55		
Wind load sq-ft	6			9		
Weight	20.5			31		
Mast size	50			50		
Price	\$1100			\$1641		

Model	10-30-7LPA	7.2/10-30LPA
Bandwidth MHz	10-30	7.2/10-30
Gain dBd	7 typ	3/7 typ
VSWR	1.5:1	1.5:1
F/B dB	15	10/15
Elements	7	8
Element length	13.1	14
Boom size	9.15	12.8
Turn radius	7.93	9.76
Wind load sq-ft	8.25	12
Weight	32	46
Mast size	50	50
Price	P.O.A.	P.O.A.



**10-30-7LPA**



## What makes one manufacturer stand out?

In the case of antennas it is simple. The designs must be good. These are, they have been created by some of the best designers in the business. The materials must be good. These are because only the best will do for the craftsmen at Mirage/ KLM. They select only the best quality aluminium alloys for booms and elements, all stainless steel hardware, precision moulded insulators and the best quality materials for baluns and chokes. The antennas must work, and without doubt the owners of Mirage/ KLM antennas will tell you that their antennas *do work*.

Time and time again the products of this one company have been proven to perform beyond expectations by commercial, government and amateur users. Place your faith in Mirage/ KLM and you can be assured of spare parts availability for many years to come as well as one of the best antennas you can buy.

But how do we know they are the best? The copiers tell us! If these weren't the best antennas you could get, why would so many people want to copy them? Trouble is you can never rely on the copy to perform as well as the original! Can you?

Model	15M-6	15M-6LD	15M-4	10M-6	10M-4
Bandwidth MHz	21-21.5	21-21.45	21-21.5	28-30*	28-30*
Gain dBd	11	10.5	7.7	11	7.7
VSWR	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
F/B ratio dB	30	30	25	30	25
Elements	6	6	4	6	4
Element length	7.62	7.62	7.62	5.49	5.49
Boom size	10.97	10.97	4.27	8.38	3.05
Turn radius	7.01	7.01	4.27	5.08	3.20
Wind load sq-ft	8.5	5	3	4	2.25
Weight	27.3	15.5	8.2	13.2	5.46
Mast size	50	50	50	50	50
Price	\$1230	\$957	\$522	\$753	\$477

Model	80M-3	80M-2	80M-1	40M-4	40M-3	40M-2	40M-1	20M-6	20M-5	20M-4	17M-3
Bandwidth MHz	3.5-4*	3.5-4*	3.5-4*	7-7.3*	7-7.3*	7-7.3*	7-7.3*	13.9-14.4	13.9-14.4	13.9-14.4	18.065-18.170
Gain dBd	7.0	4.0	0	7.2	6.5	4.9	0	11	9.7	7.7	6.5
VSWR	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
F/B ratio dB	18	12		20	20	12		30	30	25	20
Elements	3	2	1	4	3	2	1	6	5	4	3
Element length	27.44	27.44	27.44	14.02	14.02	14.02	14.18	11.28	11.28	11.28	8.54
Boom size	18.30	10.98	NA	12.80	9.76	4.88	NA	17.38	12.80	6.4	5.1
Turn radius	16.46	14.63	13.72	9.76	8.54	7.62	7.32	10.36	8.54	6.4	5.18
Wind load sq-ft	30	20	10	12	10	6	2	12.8	9.3	6.5	4.5
Weight	123	102	41	38.7	32	21	6.8	43	30	22.8	11.4
Mast size	50-75	50-75	50-75	50	50	50	50	50	50	50	50
Price	\$10,500	\$5907	\$1794	\$2202	\$1653	\$1161	\$474	\$2190	\$1521	\$984	P.O.A.



# 2 metre & misc HF antennas

## 2mtr $\frac{5}{8}\lambda$ ground plane



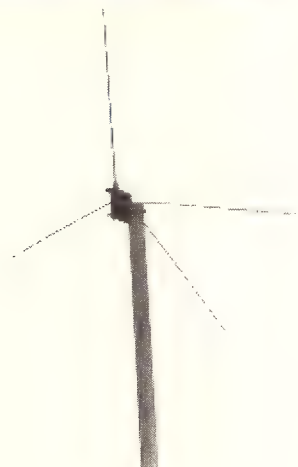
The MFJ1750 offers the greatest possible gain for a single element antenna, is rated at 300W and with its shunt fed matching network you will get the lowest possible VSWR across the entire two metre band.

Designed to mount on a 25 - 40mm mast (not supplied) the MFJ1750 is built using high quality aluminium, protected from corrosion by their molecular bonding technology, and a durable, low loss, ceramic insulator for lowest RF losses. As usual it comes with our no fuss 12 month warranty.

It's easy to assemble, easy to tune and it works!

MFJ1750 2mtr  $\frac{5}{8}\lambda$  g-p **\$42.00**

## 2mtr $\frac{1}{4}\lambda$ ground plane

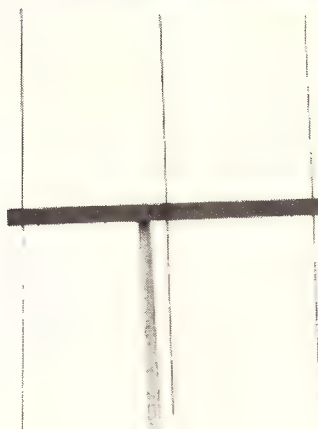


The strong, lightweight MFJ1740 is an improved  $\frac{1}{4}\lambda$  ground plane antenna design. The radial angle has been raised to 28° from the normal 45° to reduce inductive coupling, the radiator is shortened and the radials lengthened to move the feedpoint from the voltage node, thus minimising feedline radiation.

The whole assembly is made from high quality aluminium which, as with all MFJ antennas, has been coated using the unique molecular bonding process. Designed for mounting on a 25 - 40mm mast (not supplied). The MFJ1740 can also be cut for use on the 70cm band.

MFJ1740 2mtr  $\frac{1}{4}\lambda$  g-p **\$31.50**

## 2mtr 3 element Yagi



Check out MFJ's new MFJ1763, 3 element two metre Yagi. Its unique design allows it to be assembled and disassembled in seconds! Ideal for portable or emergency use. This simple, yet effective, antenna can be mounted vertically or horizontally for either FM or SSB operation and it exhibits low SWR right across the two metre band.

The MFJ1763 can be conveniently carried in a bundle no bigger than an umbrella and, weighing in at under 1kg, it is ideal for back-packing expeditions. Alternatively it can be kept easily in the boot of your car.

MFJ1763 2 mtr Yagi **\$97.14**

## 2mtr $\frac{1}{2}\lambda$ roll-up J pole



The ideal travelling companion. Roll up your MFJ1730 and stick it in your pocket, suitcase, briefcase or just about anywhere you have a little bit of space! J-pole type antennas are omni-directional, have good gain and need no ground plane.

The MFJ1730 is fitted with a BNC connector to suit most hand-held radios.

MFJ1730 Roll-up J **\$31.46**

**We always try to please, but if you have a problem please WRITE to Lyn Aird, our office manager about it. If you don't tell us what we are doing wrong, how can we fix it!**

## Hand Held Antennas



### For 2 metres and 70cm

The MFJ Pocket Linear family has been acclaimed, both here and overseas, as the greatest thing to happen to HTs since the rubber duck itself! Gives you a significant increase in range and performance.

MFJ1710 (left) is a 3/8 wave telescoping antenna for 2 metres. Collapses to fit in shirt pocket, complete with clip. Approx 133mm long collapsed, approx 622mm extended.

MFJ1710 **\$21.90**

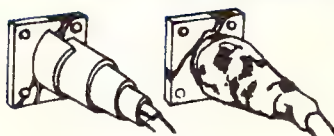
MFJ1712 (centre) is a wonder for dual band use. Collapsed (184mm) it is a  $\frac{1}{4}$  wave on 70cm, extended, (482mm) it is a  $\frac{1}{4}$  wave on 2 &  $\frac{1}{2}$  wave on 70!

MFJ1712 **\$31.99**

MFJ1714 (right) is an end fed half wave for two metres which leaves anything else just looking rather sad! Acclaimed in ARA as "the best I have ever used" by VK3YID. He should know, he owns one! Needs no groundplane. When collapsed it works like a rubber ducky.

MFJ1714 **\$36.27**

## Coax-Seal sealant



If you have any type of outdoor antenna you should be using Coax-Seal® sealant. Coax-Seal is a black rubber based material especially designed to protect any outdoor connection or connector.

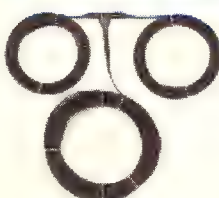
Coax-Seal is a non-conductive, non-contaminating, waterproof substance which remains flexible at any temperature. Coax connectors are not waterproof, and exposed solder connections will deteriorate.

Available in two sizes — please enquire for volume pricing.

HD124 CoaxSeal 12.7mm x 1.5m **\$4.56**

HD125 CoaxSeal 25mm x 14.5m **\$11.44**

## 20mtr roll-up dipole



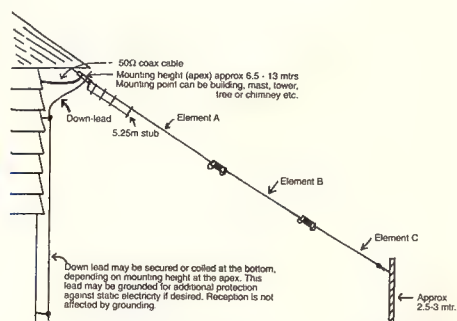
Just the thing to use with the MFJ9020, or any other QRP 20 metre transceiver! Lightweight, easy to carry, easy to put up.

MFJ1772 **\$76.90**

## SWL Sloper antennas

Following many requests in recent years we are now pleased to offer the Alpha-Delta line of American made Sloper antennas for Short Wave listening. Slopers have been used by amateurs for years because they offer the convenience of only requiring a single high support, the other end can be easily supported from a fence or a small post in the ground. The Alpha-Delta sloper is available in two sizes, one for the 90m - 13m bands and the other for medium wave (broadcast band) plus 120m - 13m bands.

Both are made from the highest quality stainless steel hardware and utilise heavy gauge hard drawn copper wire for long life and reliable operation even in strong wind areas.



MT0799 MW+120-13m SWL sloper **\$165.00**

MT2533 90 - 13m SWL sloper **\$142.80**



# RADIO WORKS

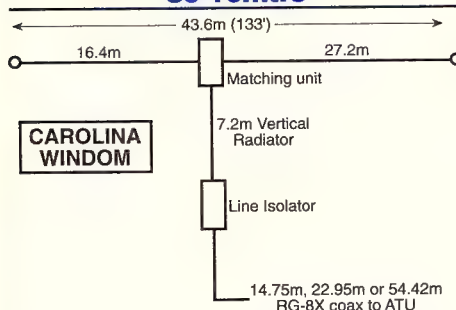
## Wire antennas

Where amateur radio is a contact sport, especially with the CAROLINA WINDOM antennas!

Ever wondered what the 'big signal' secret of the DXpeditions is? The CAROLINA WINDOM is one of them! In 1992 you heard it from Navassa and Albania, now every Australian amateur can have the same advantage.

### Carolina Windom

80-10mtrs



The CAROLINA WINDOM combines coverage of 80, 40, 30, 20, 17, 15, 12 & 10 metre amateur bands into a compact, economical wire antenna for any location. This combination of a flat-top and a radiating vertical section provides a much better radiation pattern than many other designs.

Rated for a full 1500 watts the CAROLINA WINDOM offers as much as 10dBd gain and achieves low SWR when used with any standard antenna tuner. Optimum operation will result when mounted at least 11.5 metres above ground but it is still usable at 10 metres.

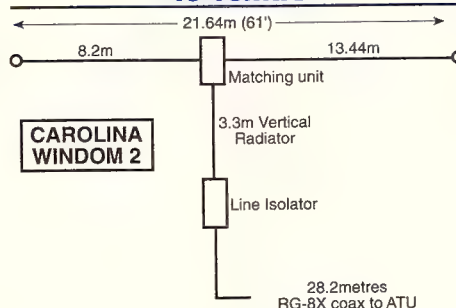
A CAROLINA WINDOM can be mounted in a number of ways to fit into limited spaces. Full details are included along with everything you need to assemble the antenna.

MT103 Carolina Windom

**\$159<sup>95</sup>**

### Carolina Windom 2

40-10mtrs



The CAROLINA WINDOM 2 might be half the size of a CAROLINA WINDOM but it still works just like its big brother! Designed for operation on 40, 30, 20, 17, 15, 12 & 10 metres the CAROLINA WINDOM 2 uses about half the ground space of the full size antenna.

It still utilizes the same vertical radiator arrangement for superb performance, is rated for a full 1500 watts and, like the others, is supplied complete and ready to go up.

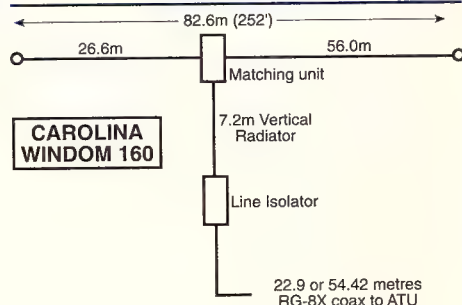
We would suggest the CAROLINA WINDOM 2 be mounted at least 10 metres above ground but if necessary it will still function as low as 8.2 metres. Full details for mounting are included with every kit.

MT104 Carolina Windom 2

**\$159<sup>95</sup>**

### Carolina Windom 160

160-10mtrs



This full size version of the CAROLINA WINDOM for 160 metres will outperform all but the largest and most difficult to install antennas for this intriguing band. Because of its size the performance on 160, 80 and 40 is absolutely amazing – better still, it covers every amateur band and still only requires a standard antenna tuner.

Like all of the members of the CAROLINA WINDOM family this antenna is rated for a full 1500 watts, achieves as much as 10dBd of gain and covers 160, 80, 40, 30, 20, 17, 15, 12 & 10 metres. Naturally its size makes it an outstanding SWL antenna also!

The CAROLINA WINDOM 160 works best when mounted at least 13 metres above ground, but is still usable at a height of 10 metres.

MT105 Carolina Windom 160

**\$215<sup>00</sup>**

## HOW IT WORKS

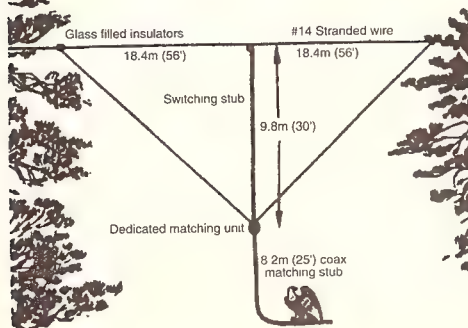
The CAROLINA WINDOM is fed off centre, causing the current in each half of the horizontal radiator sections of the antenna to be severely out of balance. Coaxial cable (which is not a balanced line) will radiate when the voltage and phase relationships are not correctly balanced. The R.F. transformer used to match the coaxial transmission line to the antenna is a special design that enhances transmission line radiation. Thus the coax serves not only as the feedline for the antenna but functions simultaneously as an effective vertical radiator. The horizontal half-wave wire section provides a counterpoise for this vertical section resulting in an inverted vertical antenna that is high in the air and free of ground losses. It is a very efficient vertical antenna. Radiation from the horizontal element is conventional. As frequency increases multiple lobes develop and the radiation angle decreases. This combination of vertical and horizontal radiation patterns produces an exceptional signal on each band. It is this combination of radiation patterns that is the secret of the CAROLINA WINDOM's outstanding performance!



## The AMAZING new SUPERLOOP

A high performance full wave loop on 80 metres usable on all bands 80-10 metres!

50 countries in 5 hours on 40m!  
with the AMAZING new Superloop



The Radio Works SUPERLOOP is a full size 80 metre full wave loop with a switching stub that 'opens' the loop on 40 metres and some other bands. Its combination of compact size, flexible mounting and excellent performance due to its low radiation angle, result in reported signal strength increases well above its theoretical 4dB gain.

A dedicated matching unit is supplied and this, in combination with your ATU, will result in an excellent match on all amateur bands from 80 through 10 metres, including the WARC bands.

Each SUPERLOOP is supplied complete with instructions, including details of how it can be mounted upside down, tilted, sloped, squared or 'rectangled'. It is recommended that the SUPERLOOP be mounted at least 13 metres above ground.

MT106 SUPERLOOP

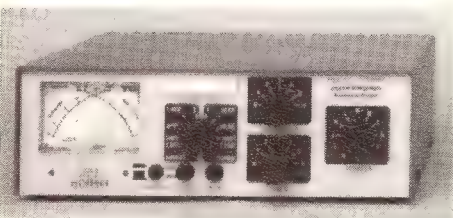
**\$171<sup>95</sup>**





True to our promise to bring you the best amateur products from around the world we are pleased to release the **Vectronics** range of products onto the Australian market. These tuners are part of the Vectronics range of high quality products built to the most exacting standards, all supported by Stewart Electronics' expert technical support.

## 300WDigital peak power tuner



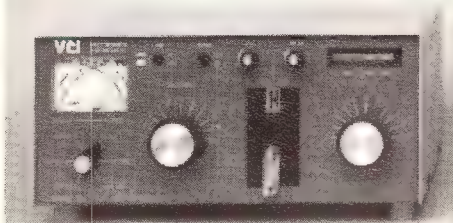
VCI's new VC300D tuner uses the same digital peak power indicator found in its HFT1500 high power tuner for ease of indicating relative peak output power.

High quality and economy are the major features of all VCI products. The VC300D features chemically treated aluminium case sections for long life as well as carefully chosen components for reliable operation over a long period.

- ★ 300W 3.5-30MHz (150W on 1.8MHz)
- ★ 4:1 balun included
- ★ 300W dummy load included
- ★ Peak and average power metering
- ★ 21 Segment digital bar graph peak power display with adjustable delay
- ★ 6 position antenna switch
- ★ Crossed needle SWR/power meter with 300W and 30W ranges
- ★ Dimensions: 259Wx89Hx239D, weighs 1.5kg

**VC300D 300W tuner \$395.00**

## 3kW PEP Roller Inductor tuner



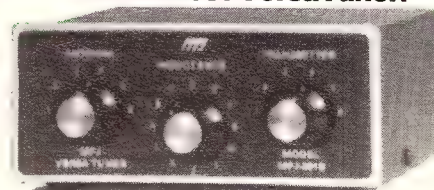
The VCI HFT1500 tuner is designed to provide the most demanding HF operator with everything needed in a tuner. High quality components are used throughout, all metal parts are Alodine-1200 coated for long life.

Unique to the HFT1500 is a digital peak reading power indicator which can be set to indicate relative peak power with adjustable delay. A precision 5 digit Veeder-Root counter is used in a gear driven arrangement for driving the roller inductor. No belts to slip or break here!

- ★ 1.5kW CW (3kW PEP), 1kW CW (2kW PEP) on 160m & 10m.
- ★ 21 Segment digital bar graph peak power display with adjustable delay
- ★ Crossed needle SWR/Power meter with illumination
- ★ 28μH 5A roller inductor
- ★ Gear driven counter on inductor
- ★ Vernier tuning on transmitter and antenna capacitors
- ★ Uses true RF directional coupler for power sensing
- ★ Balun for balanced wire feedlines
- ★ 6 position antenna selector
- ★ Dimensions: 318Wx140Hx305D; weighs 4.5kg

**HFT1500 3kW PEP tuner \$880.00**

## The smallest VersaTuner!



The MFJ901B is the smallest and most affordable of the VersaTuner range. Its small size, 127 x 64 x 150mm, and power rating of 200W, combine to produce a useful tuner when space and budget are constrained. Despite its size the MFJ901B is still built with the traditional MFJ air wound coil assembly for better performance than a toroidal core, and it will still match dipoles, vees, random wires, beams and mobile whips with either coax or balanced line feed – and even does it from 1.8 to 30MHz

**MFJ901B 200W Versatuner \$132**

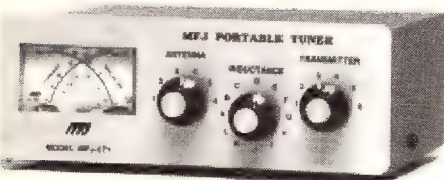
## MFJ931 Artificial Ground



Does your rig bite? Well, maybe it isn't hungry — it could just be that the ground connection you have is not adequate. But maybe you can't install a good ground. The MFJ931 just might be the answer to your problem. A specialised tuner with an RF current meter, the MFJ931 can tune a piece of wire or an existing ground wire to place an RF earth right at the transceiver. Covers 1.8-30MHz, measures 190 x 89 x 178mm.

**MFJ931 Ground system tuner \$176**

## QRP Portable antenna tuner

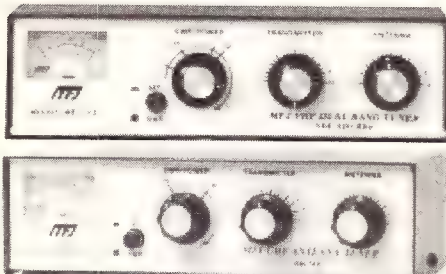


Designed to match the new MFJ9020 20metre QRP transceiver the MFJ971 tuner can be used at any frequency across the entire 1.8-30MHz HF spectrum. Rated at 200W this versatile little tuner matches the MFJ9020 in size and can be fastened to it. Despite its small size the MFJ971 has a crossed needle SWR/Power meter and a 4:1 balun for convenient operation in the field!

- ★ 200W power rating
- ★ Covers 1.8-30MHz
- ★ 4:1 balun included
- ★ Tunes coax or balanced lines
- ★ Wattmeter has 2 ranges
- ★ Matches MFJ9020 transceiver
- ★ Dimensions: 165Wx63.5Hx152D

**MFJ971 Portable tuner \$197.90**

## Tuners for 2metres & 70cm



For mobile or base station operation choose the MFJ921 (two metres) or MFJ924 (70cm) for an efficient little tuner that will handle up to 300W PEP in a compact 203 x 64 x 75mm package.

**MFJ921 2 metre tuner 300W \$154**

**MFJ924 70cm tuner 300W \$154**

## Receiving tuner/preamp.



Don't miss that rare DX station because your receive antenna wasn't tuned correctly, or because you lost some signal between the antenna and the receiver. With the MFJ959B you can provide proper impedance matching for optimum signal transfer and up to 20dB of preamplifier gain. A 20dB attenuator is also available to reduce overload problems. Select between two antennas and two receivers. Requires 9-18V DC, 229 x 50 x 150mm.

**MFJ959B Receiving tuner/preamp \$197.90**

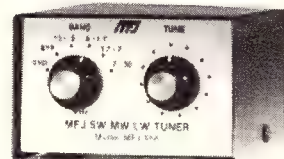
## Tuner / Preselector for transceivers



The MFJ1040B helps you dig those weak signals out from the sludge that you so often find is not rejected by the front ends of some transceivers. The addition of a receive preselector to a 300W rated tuner could be just the trick! Also has 20dB attenuator, handles two receivers, two antennas and has automatic RF sensing bypass circuit. Covers 1.8-54MHz. Requires 12V DC.

**MFJ1040B 300W tuner/preselector \$222**

## All band Preselector/tuner



The MFJ956 offers a low cost solution for receiving only where tuning and/or preselection is required. For use at long wave, medium wave and short wave, this handy little unit covers 150kHz to 30MHz and is especially useful below 2MHz. Has tuner bypass and receiver grounding provisions.

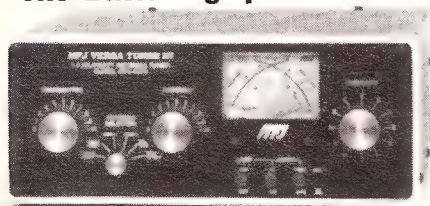
**MFJ956 Receiving preselector/tuner \$102.50**

**Don't forget to allow for freight and insurance!**  
**For details read the front cover of this catalogue.**



If you want nothing less than the best, then MFJ tuners are for you, using only the highest quality components, many of which are made EXCLUSIVELY for MFJ!

## 1.5kW Tapped inductor — The 'Basic' High power tuner



The MFJ962C 1.5kW tuner is the answer to all those situations where a 300W tuner just isn't enough. If you are operating a linear at the legal limit then the MFJ962C is for you. A high quality, high inductance, tapped inductor is combined with two continuously variable capacitors to provide the widest possible matching range at frequencies from 1.8 to 30MHz. Why settle for a 300 watt tuner when, for only a little more, the MFJ962C can grace your operating bench?

- Widest possible matching range for lowest possible SWR!
- Peak reading power and SWR meter with two ranges
- Illuminated meter (uses 12V DC supply, not included)
- Extra heavy contact pressure for greatest reliability
- Covers entire 1.8-30MHz range
- 6 position antenna switch for 2 coax lines, random wire or balanced lines or external dummy load.
- Super heavy duty balun wound with Teflon wire
- Tilt stand for ease of viewing
- Compact 273W x 514H x 381D all metal case

MFJ962C 1.5kW tapped inductor **\$510**

## 300W Deluxe tuner with dummy load and everything else!



- Full 1.8-30MHz coverage
- Peak and average reading crossed needle SWR/Power meter (can be illuminated)
- Built in 300W dummy load
- 6 position antenna switch
- 4:1 balun for balanced lines or long wires
- Full 12 month warranty

Why settle for an imitation when for only \$330 you can have a genuine MFJ antenna tuner?

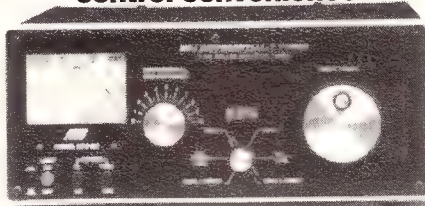
With a single high-Q inductor and two high quality capacitors the MFJ949E offers better matching than tuners using two inductors, yet takes up considerably less space in your operating position. In fact, it is small enough to use portable or mobile.

The built-in 300W dummy load makes tuning sooo easy! It helps to reduce needless QRM, protects your finals and you'll find it invaluable for testing and adjusting transceivers.

Why not join the many hundreds of satisfied MFJ949E owners in Australia, as well as the tens of thousands around the world!

MFJ949E Deluxe 300W with 'the lot' **\$330**

## 3kW Differential - T for two control convenience

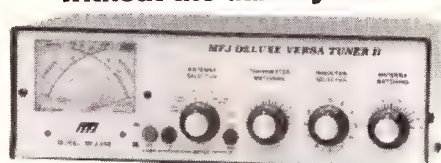


The MFJ986 Differential-T 3kW tuner is an innovative new design suggested by Boyce Taylor, W5GZM. By using a single 'differential' capacitor a tuner has been produced which has the same quality of parts as the other MFJ tuners but with the savings of reduced component count and the added convenience of two control operation. Capable of providing an optimum match at just one setting the MFJ986 also has a new, higher directivity, directional coupler for more accurate SWR and power measurements and a new current mode balun for improved results when using balanced feed to the antenna.

- Lighted crossed needle SWR/Power meter for peak or average readings of power & SWR in two ranges.
- New, more accurate directional coupler
- New current mode balun for reduced feedline radiation
- 6 position antenna switch
- Continuous coverage from 1.8-30MHz
- Wide spaced capacitor for true 3kW rating
- High-Q roller inductor positioned for best efficiency
- Extra heavy contact pressure for greatest reliability
- 3 digit turns counter dial for inductor
- Compact 273W x 514H x 381D all metal case

MFJ986 3kW Differential - T **\$636**

## 300W Deluxe tuner without the dummy load



So you would like all of the features of the MFJ949D but don't want a dummy load? Well here is the answer. The MFJ948 is identical to the MFJ949D but has no dummy load!

MFJ948 Deluxe 300W, no dummy load **\$285<sup>60</sup>**

## Long-wire tuner



This simple little tuner will allow you to operate just about anywhere with a random wire antenna. Matches high or low impedances, handles 200W PEP and is small enough to fit in your pocket. 50 x 75 x 50mm.

MFJ16010 200W Long wire tuner **\$87<sup>90</sup>**

## Mobile antenna matcher



Help your mobile rig run better with this simple yet effective mobile antenna matcher. Measures 64 x 64 x 40mm

MFJ910 Mobile antenna matcher **\$42<sup>70</sup>**

## 3kW 'Deluxe' tuner with dummy load and all features



The MFJ989C 3kW tuner is not for everyone — quite frankly not everyone can afford it. However, if you make the investment, you will get what we believe is one of the finest 3kW tuners your money can buy.

By combining 6kV rated capacitors with polished and bevelled plates and a roller inductor designed to work as well at 10 metres as it does at 20m, MFJ has produced a true masterpiece of amateur antenna tuner design. The combination of features will provide the most demanding amateur with all the matching capability he demands with a beautifully finished, all metal case.

- Widest matching range for lowest possible SWR!
- Peak reading power/SWR meter has two ranges
- Illuminated meter (uses 12V DC supply, not included)
- High-Q roller inductor positioned for best efficiency
- Extra heavy contact pressure for greatest reliability
- 3 digit turns counter dial for inductor
- 6kV rated capacitors
- Covers entire 1.8-30MHz range
- 50Ω 300W Dummy load built in
- 6 position antenna switch
- Super heavy duty balun wound with Teflon wire
- Tilt stand for ease of viewing
- Compact 273W x 514H x 381D all metal case

MFJ989C 3kW Deluxe **\$769**

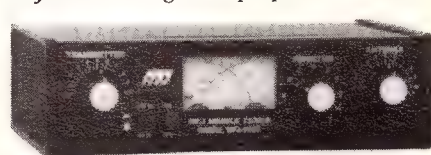
## 300W General purpose and mobile tuners

The babies have grown up! For many years the MFJ941 and MFJ945 tuners have been the most popular tuners ever sold. Now they have been given a new lease of life with the addition of Crossed Needle SWR/Power meters, making life easier for you now that you no longer need to adjust the SWR meter. Compare that to anything else on the market!



The MFJ941E is the latest version of MFJ's fastest selling tuner ever. With full 1.8-30MHz coverage, front panel — mounted antenna switch, 12 position tapped inductor, 4:1 balun and sturdy metal case it is no wonder this tuner is so popular. Its 267W x 73H x 178D size doesn't hurt either, making it suitable for almost any use you can think of.

MFJ941E 300W general purpose **\$243**



Now that the MFJ945D has a crossed needle SWR/power meter it is equally at home in the car, caravan, motel room, tent or your home station. The small, 200W x 52H x 150D, size of the MFJ945D doesn't hurt either!

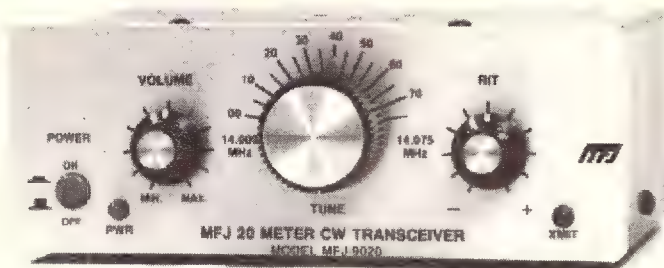
MFJ945D 300W mobile tuner **\$198**



# MFJ 20 mtr QRP CW transceiver MFJ

**Throw this tiny rig into a corner of your briefcase and enjoy DXing or ragchewing where ever you go!**

- ✓ 5W semi-break in CW transceiver
- ✓ Covers 14.000 – 14.075MHz
- ✓ High performance superhet receiver
- ✓ 8 pole crystal filter
- ✓ RIT and vernier tuning
- ✓ Automatic Gain Control
- ✓ Built-in sidetone generator
- ✓ Optional built-in Curtis chip keyer
- ✓ Optional narrow audio filter



**MFJ9020**  
20mtr 5W CW  
transceiver  
**\$395.00**  
Plus \$12 freight and insurance

With this tiny QRP rig you need never be without a radio again, no matter where you go! You can turn lonely nights into exciting adventures as you contact fellow amateurs around the world or around the corner.

The five watt output of the MFJ9020 will usually be enough to work the world on 20 metres, even with a makeshift aerial.

At home you can use the MFJ9020 as a second rig with a good dipole, vertical or beam — imagine working DXCC with just five watts! Big gun DXers can try a new challenge for the price of a single station accessory.

## BASIC SPECIFICATIONS

Transmit and receive coverage of the lower, CW, portion of 20 metres, 14.000 - 14.075MHz. Measures 165W x 152D x 64H, weighs around 800g without options. Uses 12-15V DC from an external power supply. Provide your own, or use the MFJ4112, 12V battery pack. This optional external unit supplies 12V DC from eight D size cells (not included). Optional narrow audio filter, MFJ726, and Curtis chip lambic keyer, MFJ412, can be fitted.

## SUPERHET RECEIVER

In the MFJ9020 you get a high performance superhet receiver with a selective, double-tuned front end and double balanced mixer. It's sensitive enough to copy weak DX signals, right down to the noise floor, yet resists overload when a strong local comes on.

What you hear is what is there! Birdies and images are eliminated with this single conversion design with a high 10MHz IF.

Ball bearing reduction drive and linear frequency read-out give you smooth, precise, tuning.

A full half watt of audio power gives you plenty of volume from the built-in speaker or your headphones.

## RAZOR SHARP SELECTIVITY

Slice through the QRM and pick weak signals out of the 'mud' with an eight pole crystal filter that gives you razor sharp selectivity with steep sided skirts. Get even better selectivity with the optional MFJ726 audio filter.

## Portable antenna tuner



An ideal companion for the MFJ9020! The MFJ971 Portable antenna tuner has a crossed needle SWR/Wattmeter, covers 1.8-30MHz, has a balun for feeding balanced lines and random wires. Handles a full 200W PEP. Tunes coax, balanced lines, random wire. Measures 165W x 152D x 64H, the same as the MFJ9020. Can fasten to the MFJ9020, and with the MFJ4112 can form a complete station.

MFJ971 QRP antenna tuner **\$197.90**

## Convenience plus...



Combine the MFJ9020 with an MFJ971 tuner and an MFJ4112 power pack and you have a complete, self contained portable 5W CW station you can take just about anywhere!

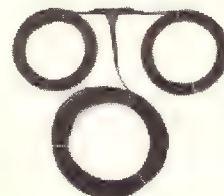
## Portable power pack



Holds eight D cells to provide a power pack for the MFJ9020. Can be combined to form a complete portable transceiver.

MFJ4112 Portable power pack **\$131.90**

## 20mtr roll-up dipole



Just the thing to use with the MFJ9020, or any other QRP 20 metre transceiver! Lightweight, easy to carry, easy to put up.

MFJ1772 **\$76.90**

## Transistorised Dip Meter

### The Dipper is back!

For many years the mainstay of every amateur test bench was the G.D.O. or Grid Dip Oscillator, but they disappeared some years ago.

Now we have a modern, solid state, Dip Oscillator that covers pretty well every need you can find for such a device. The DM-4061A covers the range 1.5 - 250MHz in 5 ranges, can function as a dip oscillator or an absorption wavemeter, also has 2kHz modulation for receiver testing. Uses a single 9V battery (supplied) or an external source of 9-12V (not supplied).

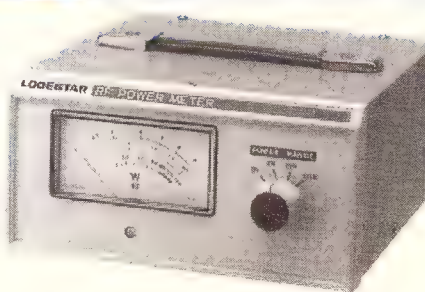
Large colour-coded dial and easy to view meter make this instrument easy to use. Very low power consumption, around 2mA, ensures long battery life. An absolute must for every experimenter!

DM-4061A Dip Oscillator

**\$149**



## Terminating Power Meter



PM-330  
120W power meter  
**\$258.00**

Lodestar's PM-330 is a dummy load or terminating type power meter designed for use over the entire HF, VHF and Low UHF spectrum. It offers a convenient way to monitor transmitter output during alignment and testing. A large meter is used with three separate scales, one for each range, making this instrument very easy to read. Power is indicated from 0.5W to 120W in three ranges. Input connector is type-N female.

An all metal case gives the PM-330 a well finished appearance, as well as the robustness to withstand everyday use.

- \* Frequency range 1.8-500MHz
- \* Impedance 50Ω±2%
- \* Accuracy ±10% of full scale
- \* VSWR <1.15 at 500MHz.
- \* Connector 'N' female
- \* Size - 190W x 105H x 230D, weighs ≈ 2kg



# MFJ

# SWR & Power meters

# MFJ



MFJ207 \$219 MFJ208 \$198.00

## Noise Bridge

The MFJ202B has long been recognised as one of the world's finest noise bridges. Boasting a hand calibrated resistance scale and an extended capacitance range of  $\pm 150\text{pf}$  and built-in range extender the MFJ202B covers the range from 1 to 100MHz with ease!

You can quickly adjust single and multi-band antennas of all types for best performance. Determine the resonant frequency of the antenna and whether it needs to be lengthened or shortened for the best SWR over a whole band or just a portion of a band. Works with any receiver or transceiver. Case size 108 x 108 x 50mm, uses 9V battery (not supplied)



MFJ202B 1-100MHz noise bridge \$162

## HF & VHF SWR Analysers

The MFJ207 and MFJ208 are rapidly becoming two of the most sought after pieces of amateur equipment around. In the short time since their release they have propelled themselves forcibly onto the best seller list and look like staying there! Designed for the ultimate in convenience when tuning antennas, checking amplifiers and installing feed lines the SWR analysers have a low level R.F. source, an SWR bridge and a fully automatic SWR calculating circuit that offers point and shoot convenience with excellent accuracy.

The MFJ207 covers 1.8-30MHz in 5 bands while the MFJ208 covers 136-150MHz in a single band. Both units can use an internal 9V battery (not supplied) or an external 9-18V DC source. An output is provided for connecting a frequency counter to permit accurate readings when checking narrow band antennas. Vernier drives are fitted to the tuning controls for ease of use.

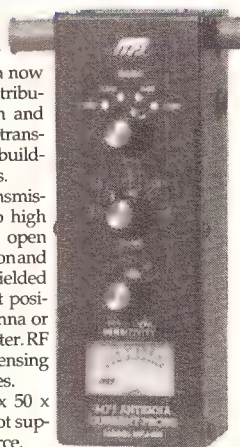
Ideal for use up the tower when installing antennas, you don't need to have someone else in the shack to check the SWR while you work. Nor do you have to expose yourself to high level RF fields in the process.

## Antenna Current Probe

The MFJ206 is designed to measure RF current without the need for direct connection. You can now determine the current distribution, RF radiation pattern and polarisation of antennas, transmission lines, guy wires, building cabling and enclosures.

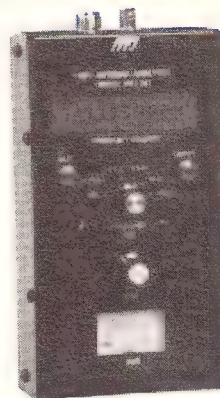
You can check for transmission line radiation due to high SWR or poor balance of open wirelines. Detect re-radiation and pin-point RF leakage in shielded enclosures, locate the best position for your mobile antenna or use it as a field strength meter. RF current is monitored by sensing the magnetic field it creates.

Measures only 100 x 50 x 50mm, uses 9V battery (not supplied) or external DC source.



MFJ206 Antenna current probe \$173

## Now with digital frequency readout!



MFJ247 HF SWR analyser w counter \$418.00

When the MFJ207 was first introduced to the Australian market both Neil Duncan and Ron Fisher commented in their reviews that it would be nice if it had a built-in frequency counter for accurately setting or reading the frequency. Well we listened! Now MFJ has added a complete 150MHz counter into the SWR analyser. Use it as a digital display for the internal signal source or as a frequency counter with .01, .1, 1 & 10 second gate times giving you 0.1Hz resolution!

The easiest way ever to measure SWR from 1.75 to 30MHz!

## Hand-held power & SWR meters

### MFJ840

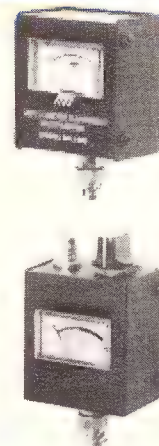
Reads the output power of two metre hand-held transceivers. Five watts full scale with 50 $\Omega$  BNC connector. 50 x 57 x 40mm

MFJ840 \$45.00

### MFJ841

Connects directly in line to measure power and SWR of two metre hand-helds. Read SWR from 1:1 to 1.6:1 and power up to 5 watts. 50 $\Omega$  BNC connectors, 50 x 57 x 40mm.

MFJ841 \$92.00



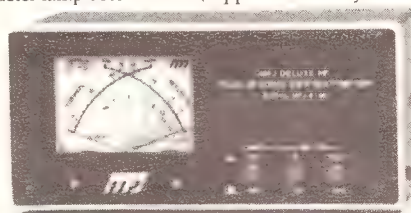
## Crossed needle SWR/Wattmeters

Don't risk your expensive 144 or 440 MHz rig by transmitting without knowing your SWR! Weather, age or a slight bend in your antenna can send your SWR to dangerous levels. Let the MFJ-817 UHF/VHF Cross-Needle SWR/Wattmeter show you peak or average forward and reflected power - all at a glance on power ranges of 200/20 watts forward and 5/50 watts reflected. A glance at your MFJ-817 you can see SWR from 1:1 to 8:1. No more risky guessing. Illuminated, large, two-colour meter makes reading easy. Black aluminium cabinet measures 184 x 114 x 90mm. Lamp uses 12 VDC (supplied externally)



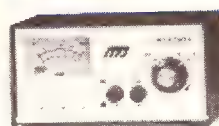
MFJ817 2m/70cm SWR/Wattmeter \$176

The MFJ-815B has a new peak and average reading function! It lets you monitor SWR, forward and reflected power - all at a single glance! Read peak or average forward and reflected power in 2 ranges, 200/2000 watts forward and 50/500 watts reflected, and SWR from 1:1 to 8:1. Covers 1.8 to 30 MHz. Accuracy is  $\pm 10\%$  of full scale. Mechanical zero adjustment for meter movement. Easy push button selection of range, meter lamp and peak or average functions. The attractive black aluminium cabinet measures 184 x 114 x 90mm. 50-239 connectors. Meter lamp uses 12 VDC (supplied externally).



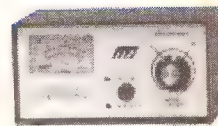
MFJ815B 1.8-30MHz SWR/Wattmeter \$151

## VHF & HF SWR & Wattmeters



The MFJ812B is the world's most popular & affordable VHF SWR & Wattmeter. Covering the 2mtr amateur band, this handy unit reads forward and reflected power in two ranges (30 or 300 watts) and also lets you read relative field strength from 1-170MHz or SWR from 20 metres through 2 metres.

MFJ812B \$67.50



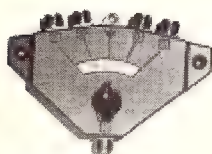
MFJ816 HF SWR & wattmeter lets you read forward and reflected power on two scales of 30 and 300W from 1.8-30MHz. Constructed in a sturdy aluminium case finished in black with an egg-shell white panel. Easy to read two colour meter scale, case size 114 x 57 x 75mm.

MFJ816 \$67.50



## Heavy duty 4 pos switch

Lightning Protection, centre ground pos'n.



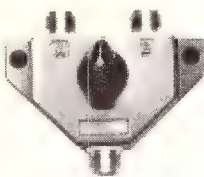
The MFJ1704 series switches are designed for use up to 500MHz and are offered with UHF or type-N connectors. They handle a full 2.5kW PEP with extremely low SWR. Isolation is better than 60dB at 30MHz and still >50dB at 500MHz.

MFJ1704 with UHF(F) connectors **\$131.90**

MFJ1704N type N(F) fittings **\$153.90**

## Heavy duty 2 pos switch

Lightning Protection, centre ground pos'n.



The MFJ1702B is a redesigned version of this very popular switch that combines new features, such as a centre grounded position and 2.5kW PEP (1kW CW) rating for use in 50Ω systems. The new MFJ1702BN, with 'N' type connectors is rated to 1.1GHz. Isolation >60dB @ 300MHz and >50dB @ 450MHz. Insertion loss <0.2dB, SWR < 1:1.2.

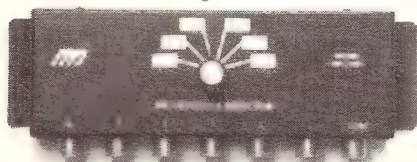
MFJ1702B Standard UHF(F) fittings **\$48.30**

MFJ1702BN with type N(F) fittings **\$70.50**

## Antenna & Transceiver switches for HF

### MFJ1701 6 positions SO239

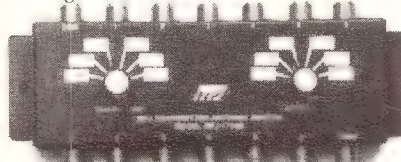
The MFJ1701 is a six position switch intended for use up to 2kW PEP in 50 to 75Ω systems at frequencies up to 30MHz. A high quality ceramic wafer switch is used and unused terminals are grounded.



MFJ1701 6p HF switch **\$76.50**

### MFJ1700B 2 x 6 positions SO239

The MFJ1700B has two ceramic rotary switches that let you select 1 of 6 antennas and 1 of 6 transceivers in any combination. Rated 2kW PEP for 50-75Ω loads, unused terminals grounded.



MFJ1700B 2 x 6p HF switch **\$142.80**

## Remote Coax Switches

The Ameritron RCS-4 is a remote controlled coax switch that selects one of four outputs by supplying all control voltages through the coax cable itself. You get two units, a switching box that mounts outside on the tower or wall and the control console that is placed at your operating position.

No. of positions	4
Loss at 30MHz	<.05dB
VSWR	<1.1:1 from 1.8-30MHz
Power	1.5kW ave 2kW PEP 50ms

Switching time  
**RCS-4 HF 4 pos remote switch \$297**

The RCS-8V switch allows you to remotely select up to five antennas, so you can replace five runs of coax with one. Your RCS-8V will handle up to 5kW up to 30MHz and 1kW up to 150MHz. Uses 8 core cable (not supplied) to connect the two units.

No. of position	5
Loss (150MHz)	<.05dB
VSWR	<1.2:1 DC-250MHz
Impedance	50Ω
Power	5kW below 30MHz 1kW at 150MHz

**RCS-8V 5pos HF/VHF rmt switch \$328.80**



## 50Ω Dummy Loads

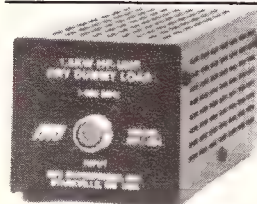


### MFJ250X 1kW DC-400MHz

The MFJ250X handles 1kW CW or 2kW PEP for 10 min, 200W CW or 400W PEP cont. Fill with transformer oil (not supplied). Low VSWR: 1.2:1 to 40MHz, 1.5:1 30-300MHz, 2:1 300-400MHz. Safety vent with removable cap. SO-239 connector, measures 191 H x 168 DIA, with carrying handle.

MFJ250X 1kW Versaload **\$62**

### MFJ264 1.5kW DC-650MHz



Another MFJ first! This load will handle 1.5kW for 10 seconds, 100W for 10 minutes. SWR <1.1:1 at 30MHz, <1.3:1 at 650MHz and usable to 750MHz. Measures 75 x 75 x 178mm.

MFJ264 1.5kW Dry load **\$129.90**

### MFJ260B 300W DC-150MHz

The MFJ260B air cooled dry load is rated at full load for 30 seconds, and is supplied with a derating curve. SWR <1.1:1 to 30MHz, <1.5:1 30-150MHz, 57 x 57 x 178mm



MFJ260B 300W dummy load **\$62**

### RA38 & RA39 Load resistors



These precision 50Ω carbon on ceramic resistors are the same high quality parts used in the MFJ260B and MFJ264 loads.

**RA38 \$29.70 RA39 \$86.40**

### 2.5kW fan cooled dummy load

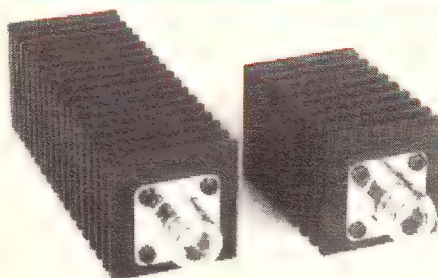
The new VCI DL2500 is a fan cooled 50Ω dummy load for use up to 150MHz. VSWR<1.3:1 @ 150MHz, Duty cycle 50% with fan, Power dissipation 2500W average for 1 minute. This compact, light weight unit is ideal for any transmitter and amplifier testing application!



An MFJ264 dummy load (not included) is shown in front of the DL2500 for comparison. Low level RF tap is available for testing and measuring purposes.

**DL2500 2.5kW dummy load \$363**

## Stripline dummy loads for UHF and Microwave applications



The VECTRONICS MT107 and MT108 are dry dummy loads utilising stripline resistors to give optimal performance at UHF and microwave frequencies.

MT107		MT108	
Power rating	40W	Power rating	75W
Impedance	50Ω	Impedance	50Ω
Frequency	DC-4GHz	Frequency	DC-1.5GHz
VSWR	<1.25	VSWR	<1.25
Derating		Derating	
80°C	100%	80°C	100%
100°C	50%	100°C	50%
Duty cycle		Duty cycle	
Free air	5 mins	Free air	5 mins
Blown @ 30cfm	30 mins	Blown @ 30cfm	30 mins
Connector	N female	Connector	N female
<b>MT107</b>	<b>\$174</b>	<b>MT108</b>	<b>\$198</b>



# MFJ Antenna accessories BENCHER®

## MFJ Low Pass Filter

Now you can eliminate or minimise TVI with this new MFJ low pass filter that connects between your transceiver and antenna. It's the best way to ensure your transceiver does not cause harmonic interference to your neighbour's TV. Rated to carry 1.5kW from DC-30MHz, SWR <1.5:1 to 30MHz, minimal insertion loss, high harmonic attenuation.

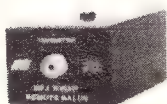


MFJ704 Low pass filter

**\$79.90**

## Outdoor balun-in-a-box

Use balanced line without the hassle of bringing it inside with the MFJ912 balun box. Works with most tuners to feed any balanced line so you can still use ladder line. Mounts on wall or tower.



MFJ912 Outdoor balun box

**\$79.90**

## Low Pass filter



Tired of being the Channel Master? Wasn't it only last week you discovered that WAC meant worked all Continents not Wrecked all Channels! But honestly this is the best low pass filter we have ever seen. Carefully crafted from the finest materials the Bencher low pass filter offers a minimum of 80dB attenuation or better in tests conducted by independent laboratories to measure the harmonic suppression in Ch 2 TV and higher.

An essential tool in EVERY HF amateurs shack!

MT093 Bencher Low Pass filter

**\$102.00**

## Bencher 1:1 balun

The Bencher balun is a 1:1 matching device designed for feeding antennas needing a balanced feed from a coaxial cable. No ferrite core is used in this design so there is no saturation effect to cause TVI. Even better, the Bencher balun is rated at 1.5kW continuous, 5kW peak, and is able to withstand significant mismatch without introducing distortion, harmonic radiation or causing TVI.

- No plastic plumbing parts
- UV resistant case
- Heavy brass terminals
- Plated copper lugs
- Custom 'O' ring on connector
- No rusting parts



MT091 Bencher 1:1 Balun

**\$64.00**

# RADIO WORKS

Where amateur radio is a contact sport!

## Current type baluns

The RADIO WORKS introduced the 'Current type' balun commercially to the amateur radio market several years ago. This type of balun is obviously superior to the common 'voltage type' baluns available today. 'Current type' baluns will give you better output balance and feedline isolation. This will give you an improved radiation pattern, reduced feedline radiation which can reduce TVI, RFI and RF feedback problems. The RADIO WORKS 'Current type' baluns provide an ideal, low loss interface between unbalanced coax and balanced antennas — just what a balun is supposed to do.

- ✓ A fresh approach to balun design
- ✓ Laboratory developed
- ✓ Heavy duty construction
- ✓ L-C compensation networks
- ✓ Reliable output connections
- ✓ High temperature, high voltage wire in all windings
- ✓ Stainless steel eye bolts

This is the most basic, low cost, high power 1:1 balun. A direct descendant of the famous RADIO WORKS C1 and B4 baluns the B1-2K is rated at a full 1500W (SWR <2:1) with extremely low losses. Input connection is via an SO-239 coax connector and the balanced connections are made directly to the wires from the balun winding. The B1-2K is ideally suited for use on dipoles, Inverted-Vs, 1/2λ centre-fed slopers, 1/4λ end-fed slopers and trap dipoles.

B1-2K 1:1 1.5kW current balun

**\$39.90**

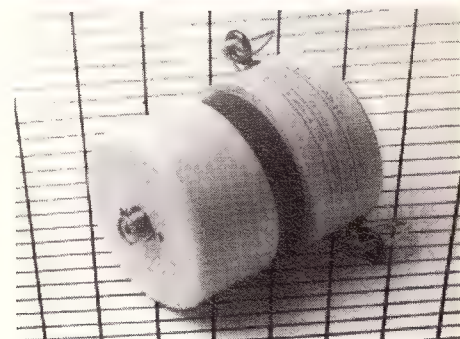


The B4-2KX is a precision 4:1 high power balun with L-C compensation networks for very flat and low SWR across the entire HF band from 1.8-30MHz. Its double core cross-coupled design is designed to permit low loss operation with very good balance to reduce RFI, feedline radiation and RF feedback. To prevent any chance of unreliable connections the wires from the internal winding are brought out to permit direct connection.

The B4-2KX is suited to Delta Loops, Folded dipoles, Folded uni-poles and multi-band loops. A unique feature of the B4-2KX is its suitability for use on 160 metres in low impedance applications.

B4-2KX 4:1 1.5kW current balun

**\$99**

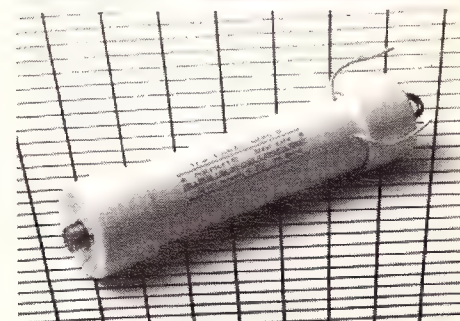


Just about every antenna tuner on the market includes an internal balun for feeding balanced feedlines (ladder line). But really you shouldn't use them! The proximity of equipment and objects in your shack can result in large amounts of RF floating around the shack, RF feedback, microphone bite and distortion of your transmitted signal, none of which are particularly desirable!

The B4-1.5KX is designed to provide a near ideal interface between a coax coming from a tuner and the open wire line going to your antenna system. Mount the B4-1.5KX outside and judge for yourself!

B4-1.5KX 4:1 remote balun

**\$86**

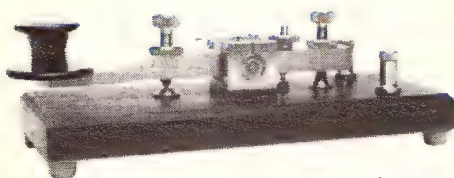


Part #	B1-2K	B4-2KX	B4-1.5KX
Impedance ratio	1:1	4:1	4:1
Bandwidth	80-10mtr	160-10mtr	160-10mtr
Centre frequency	14MHz	10MHz	10MHz
Power loss	Nil	<0.8dB	Nil
Internal tr line Z	50Ω	>40Ω	—
Winding Z @ 3.5MHz	>3KΩ	>1500Ω	—
Winding Z @ 14MHz	>50KΩ	—	—
Phase delay @ 3.5MHz	4.3°	—	—
Power rating	1.5kW	1.5kW	1.5kW
Input connector	SO-239	SO-239	SO-239
Output connector	Wires	Wire	Wires
Size	58x203mm	89x100mm	89x100mm
Weight	450g	450g	500g
Price (inc tax)	<b>\$39.90</b>	<b>\$99</b>	<b>\$86</b>



**KENT**

# Morse keys and keyers

**KENT**

MM004 Kent key kit

**\$147**

## Kent Single Paddle Key



The KENT single paddle key is designed to allow each individual operator total flexibility in setting and adjustment, achieved by the unique springing arrangement which allows separate right and left spring tension adjustment with finger tip control. The use of silver contacts mounted in precision instrument knurled screws which are fitted with locking nuts allows precise and positive gap setting.

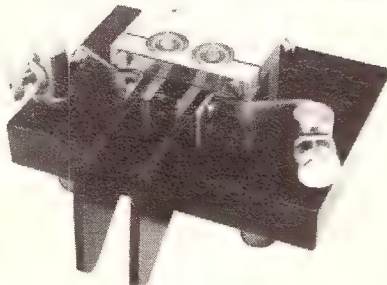
Fitted with precision shielded ball race bearings, this key is made from solid machined brass and is mounted on a heavy steel base.

MM004 Single lever key kit **\$147**

## BUILD YOUR OWN! Solid Brass Morse Key

The Kent low line Morse Key Kit is engineered to the highest specifications from solid brass. Superior, lasting and trouble free performance is achieved by the use of solid silver contacts and sealed ball race bearings, which ensure totally free pivot movement with minimum friction and virtually eliminates side play. Precision contact and spring adjustment is achieved by the use of fine pitch threaded screws with instrument knurled heads.

## Kent Iambic Paddle

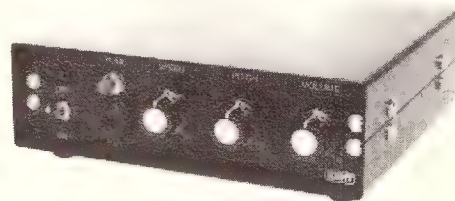


Our twin paddle (iambic) Morse key kit, like all Kent products, has been designed and engineered to the highest standards. The key assembly itself is machined from a solid brass bar which is then mounted on a solid steel base with non-slip feet for stability.

The KENT Twin paddle key can be used with the KENT Iambic keyer, MFJ Morse keyers, the MFJ1278 multi-mode controller and internal keyers such as those available for ICOM or Kenwood transceivers.

MM005 Iambic key kit **\$180****KENT**

## Kent Electronic Keyer Kit



The KENT Electronic Morse Keyer Kit uses CMOS logic to generate Morse at speeds from 5 to 40 words per minute at the standard dot-dash ratio of 1:3. Dot and dash memories with self completing characters are used to give iambic operation for squeeze keying and the built in side-tone has fully adjustable pitch and volume controls.

Transmitter keying is via a reed relay with contacts rated at 180V 500mA maximum switching capacity. The relay can be closed for continuous output for tuning purposes with a front panel tune switch.

The kit is supplied with the circuit board pre-assembled and tested to reduce the likelihood of errors. A ready punched and screen printed case and all hardware necessary to complete the assembly is included. Assembly takes approximately two hours using only basic hand tools and no test equipment or setting up is required on completion. Requires external 12V DC power supply (not included).

MM007 Iambic keyer kit **\$156**

## Put the fun back into CW with...

**BENCHER**

## the ultimate in iambic keying technology

**ADJUSTABLE CONTACT POINT SPACING**—Precision screw adjustments on each set of contacts make exact settings easy. Contact posts are split and locked by set screws, eliminating lock nut 'drift'.

**WIDERANGE OF TENSION ADJUSTMENT**—Tension on the finger knobs is maintained by a long expansion spring. Dual screw adjustments allow you to vary the tension independently on each paddle to suit your 'fist'.

**SELF ADJUSTING NEEDLE BEARINGS**—Keying shafts pivot in nylon bearings that float on precision steel pins. Spring tension prevents free play and slop, eliminating contact bounce and backlash.

**GOLD PLATED SILVER CONTACTS**—The contacts points are gold plated silver for a lifetime of flawless keying.

**POLISHED PADDLES**—Lucite paddles are machine polished for a silky feel.

**PRECISION MACHINED COMPONENTS**—Main frame, contact posts, spring post and bearing rings are all machined from solid brass then chrome plated for durability and rich appearance. The Bencher paddle looks as good as it works!

**HEAVY STEEL BASE**—The total weight of the key is 1.36kg which means that with its non-skid feet it won't move around the bench. Choice of base finishes available. Base measures 95 x 102 x 16mm.

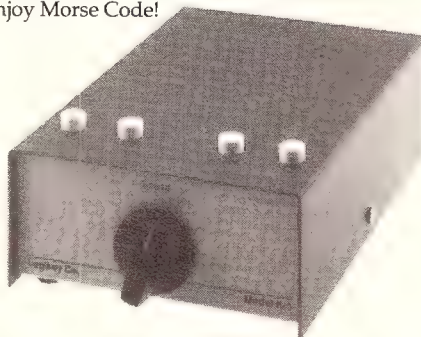
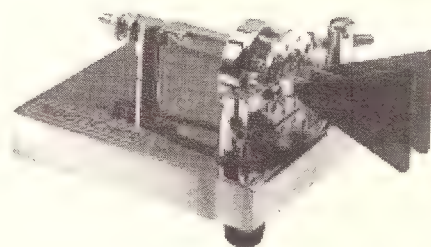
Remember the days when CW was fun, when you couldn't wait to get home and spend long hours into the evening over a 'hot' key working all those new and unusual countries? Let Stewart Electronics, Bencher and LogiKey help put some of the magic back into CW with some of the most precisely engineered and innovative products on the CW scene today. The immaculately presented precision of the Bencher Iambic and Single Lever keys is perfectly complemented by the elegant simplicity of the LogiKey keyer. The LogiKey keyer is so simple to use you only need to know Morse Code to use it! Look, no masses of knobs, just the elegance of a keyer designed and built by a Morse Code aficionado, for those who want to enjoy Morse Code!



MM001 (Iambic, black)

**\$132.00**

MM002 (Iambic, chrome)

**\$162.00**MM008 LogiKey keyer **\$248.40**

MM003 (Single lever, black)

**\$132.00**MM003A (Single lever, chrome) **\$162.00**

The LogiKey keyer can be fitted with an optional remote control unit which can be mounted to the Bencher Iambic Keys. Take the controls of the keyer direct to the key, right where you want to use them. The remote control is shown here attached to an MM001 key. (Key not included in price)

MM008A (Remote control) **\$84.10**



## MFJ GrandMaster II

**More than user-friendly...  
It's really easy to use!**

Simple, intuitive, user friendly, that's the MFJ GrandMaster Memory keyer. All the features you'll ever need and easy to use!

With the exclusive CW Word Processor™ you can change a message in memory. Insert, delete or change a message easily with this unique feature. Special function keys make it easy to move around within any message. Insert, delete and change your message until it's just the way you want it. With other memory keyers you have to delete a message and re-enter it just to change one character!

You can combine messages stored in different memories for even greater ease of use. You could store QTH, rig/antenna and QSL information in separate memories and then combine them with other comments to send to the station you are working.

Speed is simply adjusted with a knob. No more wrestling with keypads or switches. With the Custom



Speed feature you programme the range over which the speed control works so you don't get big jumps each time you touch the knob!

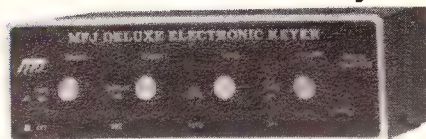
The MFJ486 also has a built in CW course so you can spend some time working on your CW whenever you want. It provides random five character groups, random one to eight character groups and random plain language QSOs based on the American FCC license testing system.

With over 8000 characters in 10 soft partitioned memories, lithium back-up battery, automatic serial numbering for contests, automatic message repeat, beaconing, type A or B iambic keying and manual or automatic word spacing the Z-80 microprocessor based MFJ486 can be powered from 12-15V DC (supply not included) for ease of installation in your shack!

MFJ486

**\$406.50**

## Deluxe Electronic Keyer



The MFJ407B Deluxe Electronic Keyer can be used with a straight key, a single lever or dual lever paddle — whichever suits you — for sending high quality Morse code. Features full iambic keying with a dual lever paddle, dot-dash insertion, semi automatic dots and manual dashes, dot-dash memory, self completing dots and dashes, jam proof spacing and instant start keying. A switch allows you to select type A or type B keying.

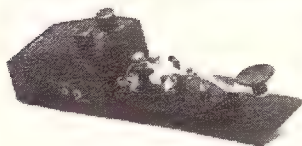
Solid state keying circuits are used to provide keying for valve and solid state rigs. Speed, weight, tone and volume controls are all on the front panel as well as ON/OFF, tune and semi-auto/auto switches. The weight control will provide negative as well as positive weighting.

The MFJ407B has a built-in speaker and uses a 9V battery (not included) or an external DC source, enclosed in a black aluminium cabinet measuring 178 x 51 x 150mm.

MFJ407B

**\$149.95**

## Deluxe Code Practice Oscillator



The MFJ557 Deluxe code practice oscillator set features a straight Morse key on a heavy non-skid steel base that stays put on your table for easier sending. The MFJ557 lets you practice code wherever you are, and it is powered by a 9V battery (not included) or an external DC source — even from the cigarette lighter in your

car, so it's easy to use wherever you go.

A volume control is provided to permit easy adjustment to a comfortable listening level. A tone control permits you to adjust the frequency to whatever pleases you. For privacy you can plug in an ear-piece, or for classroom situations you can plug in an extension speaker. Contacts are adjustable.

Measures 216 x 57 x 95mm. Finish is all black.

**\$54.99**

## the best of all CW worlds!

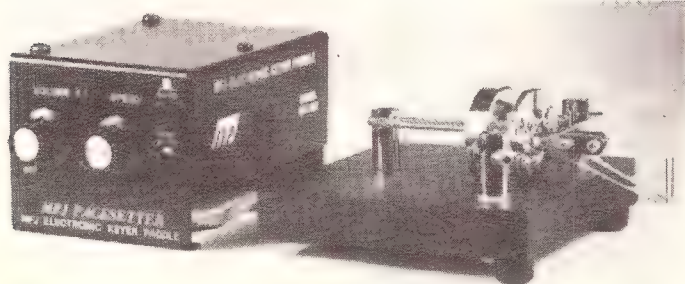
Just for the keen CW operator we can now offer the best of all worlds! MFJ, Bencher and Curtis team up to bring you America's (and possibly the world's!) most popular keyer in a compact package for smooth and easy CW.

A compact MFJ keyer using the Curtis Iambic Keyer IC which mounts directly onto the Bencher iambic paddle.

The MFJ422BX Keyer is small in size but has all the features you need. It gives you the proven Curtis 8044ABM integrated circuit iambic Keyer, has adjustable weight and tone, front panel volume and speed controls (8-50 WPM). You also get built-in dot and dash memories, speaker, side-tone and push-button selection of semi-automatic, tune or automatic modes of operation. Ultra-reliable solid state keying for grid-block, cathode or solid state transmitters. (-300V 10mA max & 300V 10mA max). Fully shielded in a black finished aluminium case the MFJ422BX uses either a 9V battery or external DC source (neither supplied).

The beautiful, functional engineering of the MFJ422BX permits it to mount onto the back of the Bencher keyer to give you a 105 x 67 x 140mm package which is a pleasure to look at and a joy to use!

Buy it with a key or mount it on your own Bencher.



MFJ422BX Keyer only for Bencher Paddles

**\$160**

MFJ422B Keyer with Bencher black iambic key

**\$292**



## PC Memory keyer

Let this amazing hardware and software package for your IBM-PC or compatible turn your computer into a full fledged memory keyer!

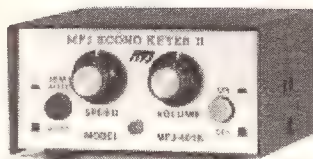
With 10 banks of 10 memories you can have a total of 100 function key macros. You can send a message within a message, pause to key in information, send part of a message at a different speed. Send CW beacons, have automatic serial numbering for contesting and all of this with on-line help! You can use a straight key, a single lever or dual lever keyer or send code from the keyboard.

For truly amazing flexibility in a memory keyer the MFJ1268 PC memory keyer should be just what you need!

MFJ1268

**\$95.00**

## Electronic Keyer II



The MFJ401B Econo-Keyer II is based on the world famous Curtis 8044ABM integrated circuit. It lets you send iambic, automatic, semi-automatic or manual with your dual lever (squeeze), single lever paddle or straight key. Front panel speed control covers the range 8 to 50 WPM and the volume control adjusts to give a comfortable listening level. Internal

controls are provided for weight, dot-dash spacing and tone.

Like all MFJ keyers, the MFJ401B has ultra-reliable solid state keying circuits suitable for valve and solid state rigs.

Uses 9V battery (not included), measures 102 x 51 x 89mm, and is finished in eggshell white and black.

MFJ401B

**\$106.90**

## Stewart Electronics your one stop Morse shop!

### Morse Code: The Essential Language

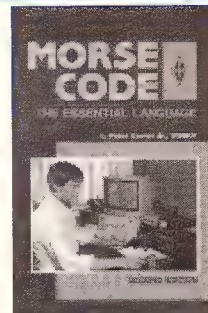
L. Peter Carron W3DKV

- Tells of the evolution from the straight key to computers
- Gives practical advice on learning the code and its modern day uses
- There are 7 chapters • Why the code •

A history of Telegraphy • The code • Learning to receive and send • High speed operation • Distress calls • The Future Morse code is steeped in tradition, not only in Amateur Radio but in other services as well. Although some of the thoughts it conjures up are of times gone by, the code is as useful today as it was the day of its invention. The new 1991 edition of this small book will help you find out much and help you to learn the code.

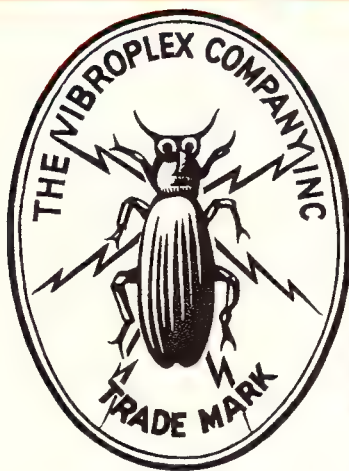
Order code BX223

**\$10.00**



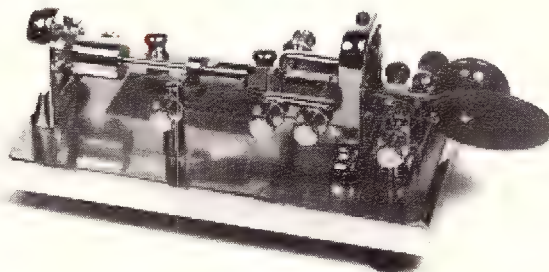


# a practical tradition...



In 1890 Horace Martin searched for relief from the "glass arm" which plagued telegraphers using straight keys. His solution was the Vibroplex Original, which was an instant success. Hailed as the first major improvement since the birth of telegraphy the Vibroplex Bug became the standard, not only for the commercial telegrapher, but for the discerning amateur as well... becoming a legend in its own time.

Today the Vibroplex organisation produces a range of keying devices, including the 'Original'. Now these wonderful products are available from stock here in Australia.



## The Original

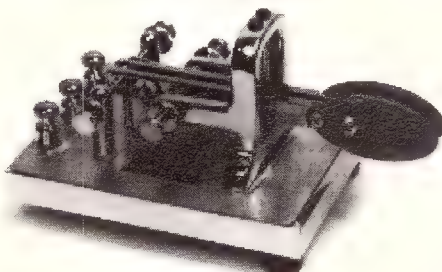
The Vibroplex Original is little changed today from the original design of 1890. Considered by many to be the greatest 'semi-automatic' keyer ever made we are proud to offer these keys in a variety of finishes and with a variety of accessories.

MM011P Gold 'Presentation' bug	\$410 <sup>40</sup>
MM011D Chrome 'Deluxe' bug	\$250 <sup>80</sup>
MM011S Grey wrinkle finish bug	\$202 <sup>80</sup>

## The Iambic

Based on the Vibroplex Original the Iambic brings the Vibroplex tradition to the modern world of Iambic keying and fully automatic keyers. Produced in response to many requests for an Iambic paddle with the Vibroplex feel.

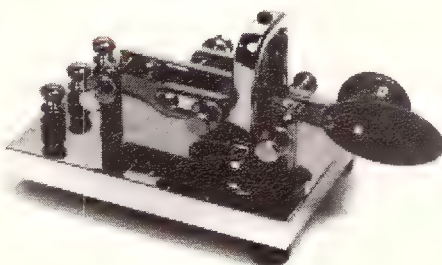
MM012P Gold 'Presentation' Iambic	\$342 <sup>00</sup>
MM02D Chrome 'Deluxe' Iambic	\$238 <sup>80</sup>
MM011S Grey wrinkle finish Iambic	\$193 <sup>20</sup>



## The Vibrokeyer

The Vibroplex Vibrokeyer is designed for the 'Bug' user who wants to move to electronic keyers. Its single lever paddle arrangement initiates the automatic dots and dashes of the electronic keyer with the same motion used to operate the 'Bug'.

MM013D Chrome 'Deluxe' keyer	\$239 <sup>40</sup>
MM013S Grey wrinkle finish keyer	\$180 <sup>00</sup>

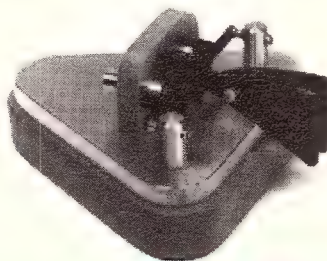


## The Brass Racer

Available in two versions, one with an internal electronic keyer, the Brass Racer is the latest in the Vibroplex line. Using magnets for tensioning this delightful little key is just the thing for mobile, DXpedition or portable use.

The Brass Racer EK-1 includes a full electronic keyer based on a Curtis chip inside the base — just the thing when space is at a premium.

MM014 Brass Racer with keyer	\$307 <sup>20</sup>
MM015 Brass Racer keyer only	\$125 <sup>40</sup>



## VIBROPLEX®

### VIBROPLEX COLLECTORS GUIDE

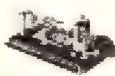
This new book written by Tom French, WHIMQ is a must for anyone interested in Morse keys. There are reproductions of every Patent for the Martin keys. The AUTOPLEX in 1903 then the first VIBROPLEX key in 1904. All the patents are reprinted in full complete with the original patent drawings.

Many details and old advertisements are reproduced to aid in identifying the manufacturing date of your bug. Also chapters on • Adjusting your bug • The collectible keys. 215 x 280mm)

Order Code BX25

### VIBROPLEX

Collector's Guide



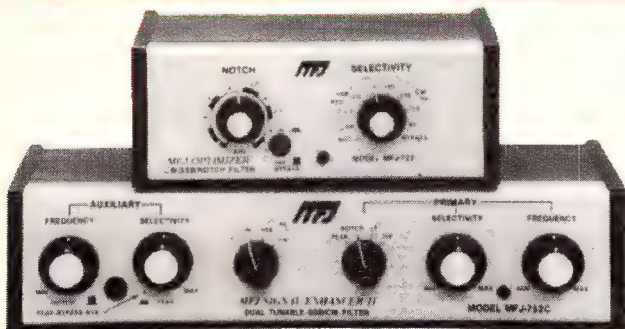
\$35.00

## Vibroplex accessories

MM016 Case (specify key)	\$79 <sup>20</sup>
MM017 Dust cover (specify key)	\$40 <sup>68</sup>
MM018 Contact burnisher	\$24 <sup>00</sup>

Any Vibroplex Presentation or Deluxe key can be engraved with your name and call sign. Please enquire for details before ordering. Engraving orders can take 6-8 weeks to arrive from the factory.

## MFJ SSB/CW audio filters



The MFJ752C all mode dual tunable filter lets you zero in and pull out your favourite stations and notch out interference at the same time. Two independently tunable filters let you peak, notch, low or high-pass signals to eliminate heterodynes and interference. Both filters are tunable from 300 to 3000Hz, bandwidth can be varied from 40Hz to almost flat, notch depth is up to 70dB. Outputs two watts of audio, sufficient to drive a small to medium size speaker. Has dual selectable inputs for use with two rigs without changing leads. Has switchable noise limiter and clipper for removing impulse noise and background noise. Uses 9-18V DC (power supply not included).

The MFJ722 'Optimiser' Audio filter is a switch selectable SSB/CW filter with selectable bandwidths of 30, 110, 150 & 180Hz centred on 750Hz, steep skirted SSB filter and a 70dB deep notch tunable over the range 300-3000Hz. Plugs into the headphone or speaker jack of the receiver. Uses 9-18V DC (power supply not included)

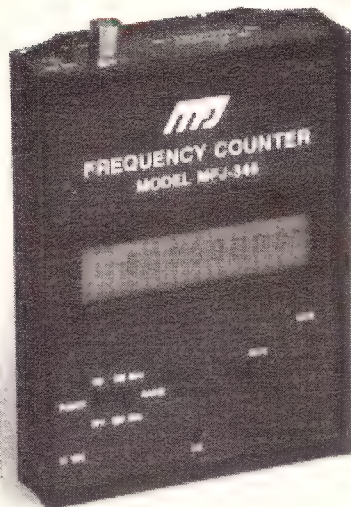
MFJ722 (top)  
**\$170.40**

MFJ752C (bottom)  
**\$213.84**



# Station accessories

## 600MHz Frequency Counter



Add the handy MFJ346 frequency counter to your station and get high accuracy frequency measurement with up to 10 digit resolution. It's also compatible with the MFJ SWR Analysers and Antenna Bridge.

Large, 6.4mm, LCD digits make for easy reading. The high contrast LCD display doesn't wash out in bright sunlight like LEDs do — they actually get easier to read the brighter the light gets!

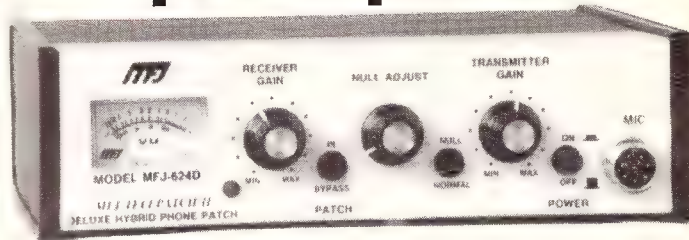
Four gate times let you select the resolution you need. Selecting a 10 second gate time gives 0.1Hz resolution. Has a high accuracy 1ppm 10MHz crystal time base with adjustable calibration.

Uses high speed ASIC (Application Specific Integrated Circuit) and LCD technology. Size: 97W x 35W x 133.4H. Uses internal 9V battery (not supplied) or external source of 12V DC.

**MFJ346 600MHz  
Frequency Counter**

**\$418**

## MFJ Deluxe hybrid phone patch



**MFJ624D**

**\$154<sup>20</sup>**

MFJs Deluxe hybrid phone patch, the MFJ624D is designed to give you crisp, clear, hum free audio, and *that* is what phone patching is all about. It is pre-wired for Kenwood, ICOM, Yaesu and Alinco radios, or others using standard 8 pin microphone connectors.

You have the option of using either VOX or Push to Talk. Pi section RF filters and PC board construction help to eliminate RF feedback into the patch unit. You can use the MFJ624D with virtually any rig.

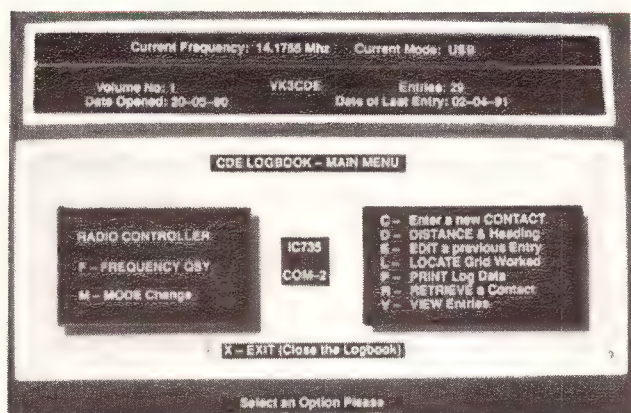
Built-in VU meter monitors phone line levels to prevent cross-talk. Adjustable null depth permits the greatest possible isolation between transmitter and receiver, in fact there are separate gain controls for transmit and receive audio to eliminate the need to repeatedly make adjustments before and after using the patch. Phone line connections use standard 'modular' phone jacks. Jacks provided for speaker, audio in and audio out. Uses 12V DC (power supply not included) or 9V transistor radio type battery.

This American made phone patch will give you more quality and more features than patches costing many times more.

**This item is not approved for direct connection to Telecom Australia lines.**

## CDE Software for ICOM base station radios.

### Electronic Logbook



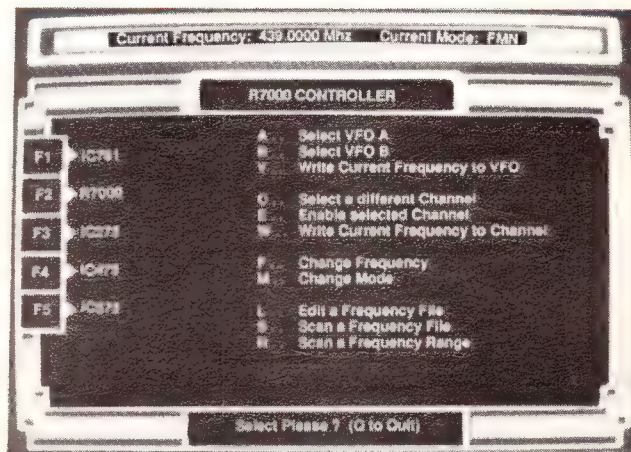
- Control your transceiver and keep a Logbook with this one simple package!
- Automatic Date, Time, Frequency and Mode entry
- Beam heading and distance from Prefix input
- Entry editing
- Maidenhead Locator recording and checking
- Multiple entry viewing
- Prints QSL card labels
- Flexible log printouts
- Directly control transceiver frequency and mode

With this simple, yet powerful, logbook programme any ICOM transceiver with CI-V interface can be remotely controlled and all information automatically entered in your log. You can check prefixes you need to work, view log entries and get an amazing array of printed reports for your records. Even better than that, it is 100% Australian too!

**\$60**

For IBM-PC and  
compatibles

### Remote Control



Control your ICOM CI-V compatible transceiver or receiver and scan frequencies stored in disk files.

- Direct mode and frequency from keyboard
- Frequency and mode list editing
- Memory channel programming and selection
- VFO selection and programming
- Scan from disk file or between preset limits options
- Control more than one radio from a single menu

Frequency lists are stored in disk files and can be easily edited from the ones supplied with the programme, created directly for your own use or you can swap files over BBS's or even packet radio! Also allows complete control of the VFOs, memories, Direct frequency and mode setting. Present frequency and mode is displayed on the top line of the screen. Multiple transceivers are selected using function keys. Please specify type of CPU, COM port to use and Radios used at your station.

**\$60**

For one radio, \$15 each  
for extra radios when  
ordered at same time

For IBM-PC and  
compatibles



# Stewart's Bookshop

## REFERENCE, PRACTICAL CIRCUITS & DESIGN

### 1993 ARRL HANDBOOK

The ARRL Handbook for Radio Amateurs has been the indispensable reference and projects book for the amateur radio operator, engineer and technician since the 1920's. The new 70th edition, with new projects and updated theory explanations, maintains its hard-won reputation as the one book that covers everything related to amateur radio and radio electronics.

The Handbook's 39 chapters cover electrical fundamentals, radio principles, modulation methods, radio-wave propagation, construction techniques, test equipment, operating aids and interference—and much, much more.

New to the 1993 edition:

- A 4.5 to 25V, 2.5 amp precision power supply • A gel-cell charger that works for all lead-acid batteries • Expanded discussion of colour and computer slow-scan television • A comparison of propagation-prediction programs • A low-cost HF frequency counter • The ChipTalker, a voice 'memory keyer' • A receiver spectral display using digital signal processing • A discussion of feedback-loop design • A discussion of simple wire antennas and baluns • Updated VHF/UHF antenna projects.

Order Code BX369

\$52.90

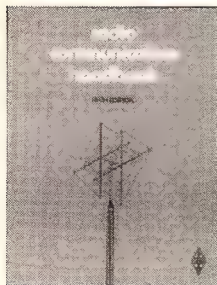


### RADIO COMMUNICATION HANDBOOK — RSGB

The Radio Communication Handbook from the RSGB, 5th Edition reprinted 1988. The society does not revise this handbook annually (or even frequently), but when the technology has changed sufficiently to justify it. This means that each new edition is virtually a new book, each chapter being completely revised and up-dated. Practical down-to-earth information which every amateur needs if he is to continue to represent a balanced combination of designer, constructor, purchaser and operator of modern radio equipment. One of the attractions of radio communication is the way in which fundamental ideas and techniques remain valid in the mist of innovation. This large handbook with 22 chapters will help in many ways.

Order Code BX266

\$56.00

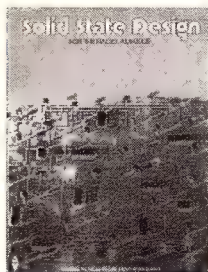


### SOLID STATE DESIGN FOR THE AMATEUR

First published by the ARRL in 1977 and reprinted by popular demand. In this 2nd printing, the occasional errors and omissions which inevitably creep into a work of this magnitude have been corrected. This large book of 256 pages by Doug DeMaw and Wes Hayward has become the 'bible' of many an avid home brewer with good reason. *Solid State Design for the Radio Amateur* is among the select few technical books that have sold more than 50,000 copies. Why has it achieved this enviable milestone? For one thing, it's chock full of good, basic information—circuit designs and their applications and descriptions of receivers, transmitters, power supplies and test equipment. Much of the data such as that on transistor modeling cannot be found in any other publication.

Order code BX171

\$24.00



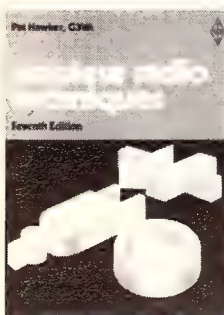
### AMATEUR RADIO TECHNIQUES

Pat Hawker, G3VA. Seventh Edition. 368 pages R5GB. This is an ideas book and a source book, not a conventional text book. It assumes the reader has, and uses, his handbooks and does not repeat basic theory and practice, but instead concentrates on new or little-understood techniques; some sophisticated, but many others which can be simply incorporated into an amateur station. This ever-popular work brings together a variety of circuit ideas and devices, information on antennas, plus many constructional and fault-finding hints, gathered in over 22 years of writing the *Technical Topics* column in Radio Communication.

CHAPTER HEADINGS: Semiconductors • Components and Construction • Receiver Topics • Oscillator Topics • Transmitter Topics • Audio and Modulation • Power Supplies • Aerial Topics • Fault-Finding and Test Units.

Order Code BX393

\$30.00

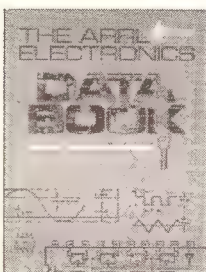


### THE ARRL ELECTRONICS DATA BOOK

The ARRL Electronics Data Book is back again by popular demand. In this edition Doug DeMaw, W1FB, has completely revised and expanded the material in this handy reference for the RF design engineer, technician, radio amateur and experimenter. This one source has all of those regularly used tables, charts and those hard-to-remember formulas. You'll also find hundreds of popular circuit diagrams of oscillators, mixers, amplifiers and other devices and their operating parameters including ferrite materials. This book may be used alone or to complement 'The ARRL Handbook' and belongs in every technical library.

Order code BX201

\$24.00

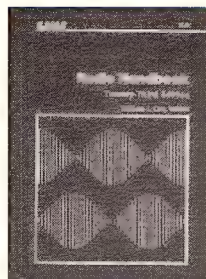


### RADIO HANDBOOK

The best ever. This 23rd edition of the Sams Radio Handbook gives complete documentation in the HF, VHF and UHF spectrum. Theory, equipment design and construction techniques are covered in detail for the advanced engineer, technician or advanced radio amateur. William Orr (W6SAI) the editor and his staff of contributing editors—all amateurs with extensive technical knowledge and experience, have added a wealth of new material on topics such as: • Electric Wave Filters • VCR Interference • Antennas for Mobile Operations. New construction projects have been added, including • High-Power HF Amplifiers • Control and Sequencing Circuits for Amateur Stations • High-Performance Low-Pass Speech Filter • An Easy-to-Build CW Filter • A New Advanced Communications Receiver. 178 x 254mm 672 pages hard bound

Order code BX22424

\$59.90



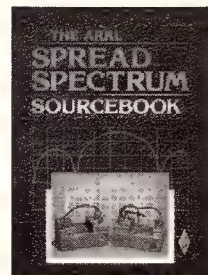
### SPREAD SPECTRUM SOURCEBOOK

If you're tired of hunting for bits and pieces of information on spread spectrum, *The ARRL Spread Spectrum Sourcebook* is for you. You'll find reprints of most spread spectrum articles from QST and QEX, as well as articles and news items from the AMRAD Newsletter. Also included in this 384 page softcover book is historical information on spread spectrum's beginnings and an introduction by Robert Dixon, a well known author on this subject.

All the information you want in one place - at your fingertips! The hunt is over.

Order code BX365

\$40.00



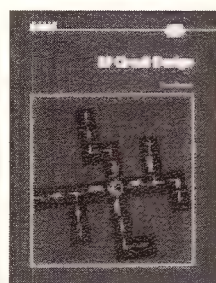
### RF CIRCUIT DESIGN

*RF Circuit Design* is written for those who desire a practical approach to the design of RF amplifiers, impedance matching networks, and filters. It is totally user oriented. If you have little RF circuit design experience, you can use this book as a catalogue of circuits, using component values designed for your application. On the other hand, if you are interested in the theory behind the RF circuitry being described, you can use the more detailed information that is provided for in-depth study.

An expert in the RF circuit design field will find this book to be an excellent reference manual, containing most of the commonly used circuit-design formulas that are needed, electrical engineering students will find this book to be a valuable bridge between classroom studies and the real world. Finally, if you are an experimenter or amateur and are interested in designing your own equipment, *RF Circuit Design* will provide numerous examples to guide you every step of the way.

Order Code BX21868

\$48.95



### HAM RADIO COMMUNICATIONS CIRCUIT FILES

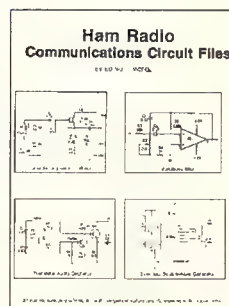
Volume 1 by Ed Knoll, W3FQJ, first printed 1980, reprinted 1991 - Large 210 x 275mm 86 pages. Even the casual experimenter can become expert with Ed Knoll's *Ham Radio Communications Circuit Files*. This book covers bipolar and field-effect transistors and linear ICs. Each circuit has been built and carefully checked out by the author. The component values are given on each schematic diagram. An explanation and often a suggested experimental procedure are included with each circuit.

Teach yourself solid state electronics by beginning with the first circuit and proceeding through the 61 circuits in this easy-to-follow book. The circuits are arranged for progressive study as in a course with experiments.

Teachers or experienced hobbyists will find they can go directly to the individual chapters for inspiration or ready to use circuits.

Order Code MFJ37

\$24.95

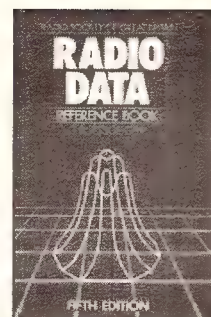


### RADIO DATA REFERENCE BOOK

Written by G.R. Jessop, G6JP, the 5th Edition of this reference book is published by the RSGB. In compiling the data for this edition the aim has been to provide an increased range of appropriate material which, if sought from other published sources, could require a lengthy search. A new section on ferrite materials has been added and the section on filters has been greatly expanded. The book contains nine parts: • Units and symbols • Basic Calculations • Resonant circuits and filters • Circuit design • Antennas and transmission lines • Radio and TV services including Australia and all major countries • Geographical and meteorological data • Material and engineering data • Mathematical tables. 152 x 230mm, 244 pages, hard bound

Order code BX189

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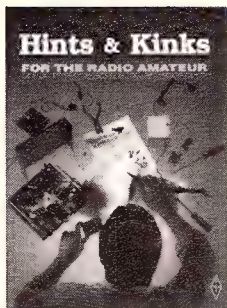




# Stewart's Bookshop

REFERENCE, PRACTICAL CIRCUITS & DESIGN

## HINTS AND KINKS FOR THE RADIO AMATEUR



Now all together in this all new book the 13th edition, 1992, from the ARRL is a collection of practical ideas from the ever popular *Hints and Kinks* column of QST. Amateur radio know how from amateurs who know how. Every article is NEW — this edition is not just an update. Join the contributors to QST's most popular technical column as they share hands-on experience in virtually every aspect of amateur radio. Whether you sample the delights by way of mike, key, keyboard or camera; whether you prefer the test bench to the traffic net or mobiling to moon bounce; whether your enjoyment of amateur radio spans days or decades. *Hints and Kinks* fixes titbits, updates, projects, antenna systems and has many practical tips. Offers many modifications to popular rigs including Icom, Kenwood, Yaesu, AEA, Ameritron, Drake, Heath, MFJ, Ten-Tec and Collins. 172 pages 210 x 275mm.

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## WIFB's DESIGN NOTEBOOK

Do you like to build amateur radio equipment? Would you like to? If your answer to either of these questions is yes, then this book is for you. By Doug deMaw, W1FB. The infamous Doug strikes again! Another supremely practical book published by the ARRL in 1990. This plain-language book is filled with simple, practical projects that can be built using common hand tools. You'll not need exotic or hard-to-find components to build the projects. Nor will you need elaborate test equipment to make them work. This book is full of all sorts of useful information on designing and building your own equipment. Has complete receiver and transmitter designs as well as all sorts of useful info and partial designs for the home brewer.

Order code BX357

\$20.00

## TRANSMISSION LINE TRANSFORMERS

Includes some 100 new transformers for the second edition, many interesting and unexpected designs, using both the Ruthroff and Guanella's approaches.

Though the primary goal of the book is to supply a great variety of transformers for matching 50Ω cable to antennas in the 1.5 to 30 MHz range, many of them should perform well in other areas. Topics covered in the fifteen chapters in the new edition:

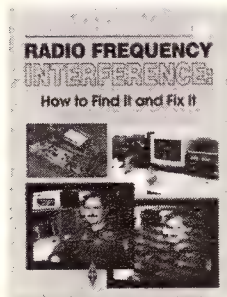
- Analysis: The basic building block • The Guanella Analysis
- The Ruthroff Analysis • High Frequency characterisation
- Transformer Parameters for Low and High-Impedance applications
- 3 chapters on Unbalanced-to-Balanced transformer designs
- Baluns • Multi-match Transformers • Material and Power Ratings
- Simple Test Equipment • Hints & Kinks • Selecting Ferrites • Winding Transformers • Constructing low-impedance coaxial cable. Stewart Electronics stocks many of the ferrite materials used in this book, 150 x 230mm hard bound

Order code BX329

\$40.00

## RADIO FREQUENCY INTERFERENCE

How to Find It and Fix It



What is it? • Black bars that flash across a TV picture in a curious, rhythmic pattern. • A garage-door opener that opens or closes by itself. • A raucous buzz that drowns out AM stations. • Car engine stumble or hesitation near radio towers. • A touch-controlled lamp with a mind of its own. These strange behaviours (and countless others) may be effects of electromagnetic interference.

If you experience these or similar problems, this book will help. Here, the ARRL has combined the work of numerous interference experts for your convenience. Chapters explain how to:

- Locate help
- Resolve conflicts
- Locate interacting equipment
- discuss RFI/EMI problems and cures for specific electronic systems:
- Transmitters
- Stereos and other audio devices
- Televisions
- Power Lines
- Computers
- Telephones
- Cars. This is a completely new book from the ARRL, paperback, 210 x 275mm.

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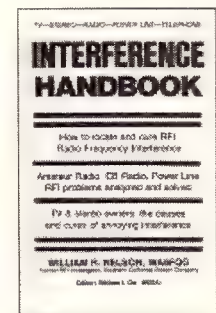
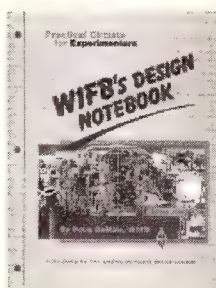
\$30.00

## INTERFERENCE HANDBOOK

By William R. Nelson, WA6FQG, edited by Bill Orr, W6SAL. WA6FQG is a former RFI investigator for Southern California Edison Company. This 250 page book is written from an RFI sleuth's perspective and is a diary of his experiences in solving interference problems. His experiences run the gamut from the common (arcing thermostats) to the bizarre (loose metal sheathing in a temporary building next to a 250kV transmission line). Besides all sorts of power line interference causes and solutions this book covers electrostatic discharge (rain or snow static), grounds and grounding, vehicle noise suppression, RFI from non-linear devices, how the power company locates RFI, how to RFI proof your transmitter, how some receivers suffer from self-inflicted RFI and solutions to RFI in various electronic devices.

Order code BX181 2nd ed. 1988

\$22.00



## MOTOROLA RF DEVICE DATA

This is the new 5th edition revised in 1990 now in two volumes. I don't know how many pages there are, but the 2 volume set is 75mm thick. Extensive changes have been made to this 5th (Rev 4) edition most important of all is the inclusion of many new products which were acquired by Motorola from the former RF device division of TRW. There are many application notes describing RF amplifiers, some of which Stewart Electronics have kits for.

2 Volume Set Order code BX47 \$35.50

## MOTOROLA RF and VIDEO APPLICATIONS

This new 512 page (175 x 235mm) application book from Motorola a total of 37 application notes on a wide range of RF and Video applications. The notes are very complete and include printed circuit layouts and photographs of many of the applications. There is not space to list the complete contents here. Some of the applications include:

- Get 600 watts RF from 4 Power FETs
- Low cost device gives broad band performance at 3 Watt out
- 300 Watt Amplifier using the TP1940 MOSFET push-pull transistors
- Phase-Locked Loop design fundamentals
- Impedance matching networks applied to RF power transistors
- A simplified approach to VHF power amplifier design
- Tuning diode design techniques — and much more.

Order Code BX428

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## MOTOROLA COMMUNICATIONS APPLICATIONS

This new 580 page (175 x 235mm) application book from Motorola contains a total of 44 application notes on a wide range of communications subjects. The notes are very complete and include a device cross reference table to application notes. There is not space to list the complete contents here. Some of the applications include:

- MC1596 balanced modulator
- Line driver and receiver applications, Equalization of DTMF signals using the MC34014
- VHF narrow band FM receiver design using the MC3362 and MC3363 dual conversion receivers
- Infrared sensing and data transmission fundamentals
- MC68HC05B4 radio synthesizer
- Low power FM transmitter system MC2831A
- Basic concepts of fibre optic communications
- Serial to Parallel Converter Using the MC6870P3 — and many, many more.

Order Code BX376

\$49.00

## AMIDON Ferrite & Powered Iron TECHNICAL DATA BOOK

This new 1992 edition of the very popular Amidon Data Book is now available. Completely revised and updated this volume contains full details including inductance charts, flux density curves, wire turns charts, on iron powder and ferrite cores for RF, RFI suppression, switch mode power supplies and broadband transformer applications. Also surface mounting beads, RF coil assemblies 'E' cores, rods, pot cores. Many new sizes and shapes have been added since the last reprinting. Stewart Electronics stocks ALL the items in this book.

Order code BX44

\$10.50

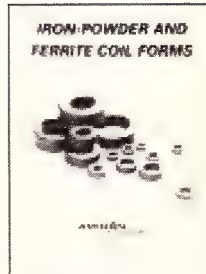
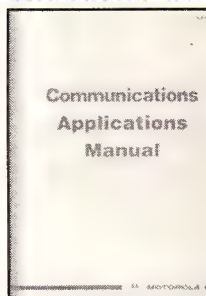
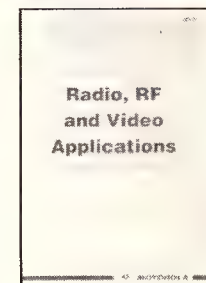
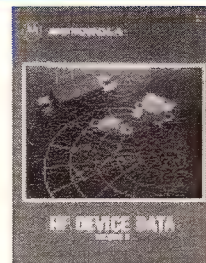
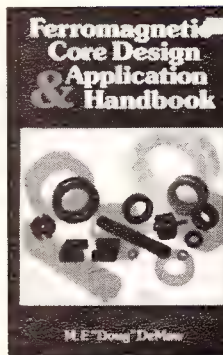
## FERROMAGNETIC CORE DESIGN & APPLICATION HANDBOOK

The author of this book, the inimitable Doug deMaw, W1FB, has compiled a complete practical and theoretical reference on *Ferromagnetic Materials*. Included are chapters on RF chokes, tuned circuits, switch mode power supplies and permanent magnet data. Many specific design examples are included to illustrate the practical application of the mathematics included. Much useful information difficult to find elsewhere on the use and design of broad-band transformers and RF chokes is to be found in this book. Extensive data is included on cores and materials to make this a 'one stop reference'.

To ensure the proper selection and use of magnetic-core materials, Doug developed his excellent *Ferromagnetic Core Design and Application Handbook*, an invaluable aid to today's engineers and technicians. Throughout his book, emphasis is on the practical aspects of magnetic cores, from low frequencies through the ultra-high. "Tedious mathematical procedures have been eliminated... to make comprehension more rapid and enjoyable," Doug writes, and "equations have been used only where they are necessary to illustrate a concept or provide a design example." The book is hard bound, 150 x 235mm, with many drawings, photographs and tables. Stewart Electronics stock all the ferrite materials in this book.

Order Code BX135

\$77.00





# Stewart's Bookshop

## VHF and MICROWAVES

### ALL ABOUT VHF AMATEUR RADIO

By William I. Orr, W6SAI, this VHF handbook is a must for every amateur getting on six metres and up. For the non-technical amateur, the text, illustrations and operating information are easy to follow and understand. For those of us who want an extra technical look at long-range DXing this book tells it all! Table of Contents: • VHF propagation • The VHF bands an overview • The VHF repeater and how it works for you • VHF moonbounce communications • Amateur satellite communications — from Sputnik to Oscar • Almost everything about coaxial Lines • VHF vertical and mobile antennas you can build • VHF beam antennas you can build • VHF interference and how you can suppress it • VHF roundup. 172 pages.

Order code BX216

\$17.30

### THE VHF/UHF MANUAL

By G. R. Jessop, G6JP. Has long been the standard text book on the theory and practice of amateur radio between 30MHz and 24GHz. This fully revised and expanded fourth edition gives full constructional details of many items of equipment. While the contents are intended primarily for the radio amateur, there is much information of value to the professional engineer. No serious VHFer should be without this book. In preparing this edition the opportunity has been taken to revise extensively the various chapters, replacing earlier designs with more modern versions. In certain cases, however, generic circuits for valves have been included, together with valve power amplifiers, and no apology is made for this action. The popularity of operation through satellites and on microwaves has grown considerably and the microwave activity pioneered by UK amateurs is growing in other parts of the world. The relevant chapters on these subjects have been significantly improved and extended.

Order code BX267

\$48.00

### THE UHF COMPENDIUM

Parts 1, 2, 3 & 4 of this work are now available in English. Parts 1 & 2 are contained in Volume 1. Parts 3 & 4 are printed in volume 2. Part 5, printed in German is now available in Volume 3. All Volumes are 8.5" x 11".

Volume 1 (parts 1 & 2) BX250 \$75.00

Volume 2 (parts 3 & 4) BX251 \$75.00

Volume 3 (part 5) BX354 \$62.50

Volume 3 is only available in German. It will not be printed in an English edition.

### THE ARRL UHF/MICROWAVE Experimenter's Manual

This book is written for the growing number of radio amateurs who are discovering that there is LIFE on our frequencies above 420MHz. Chapter topics of this 448 page book include • A brief history • Safety • Propagation • Microwave devices • Transmission media • Design techniques • System design • Microwave fabrication techniques • Antennas and feedlines • Earth-Moon Earth (EME) communications • Getting started in microwave measurements and • Tackling microwaves with microcomputers. 448 pages, 200 x 280mm.

Order code BX325

\$40.00

There are 26 programmes for PC compatible computers on diskette to aid in performing various tasks described in the book.

Order code BX327

\$20.00

### RSGB MICROWAVE HANDBOOK

The RSGB Microwave Handbook Volume 1 edited by M.W. Dixon, G3PFR. The first of three informative volumes of the series covers • Operating techniques • System analysis and propagation • Microwave antennas • Transmission lines and components • Microwave semiconductors and valves. Its 224 pages contain a largely non-mathematical presentation of microwave theory and practice. It also contains a collection of practical designs. Since the last edition of this book in 1983 there has been an almost explosive growth in amateur microwave techniques, designs and devices available, some so new that amateur exploitation has barely caught up with the technology available! 224 pages 7" x 9.5"

Volume 1 - Components & Operating Techniques

Volume 2 - Construction & Testing

Volume 3 - Bands & Equipment

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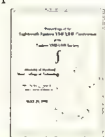
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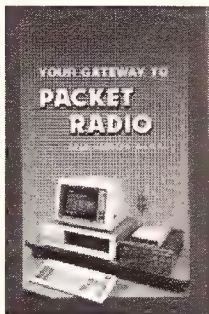
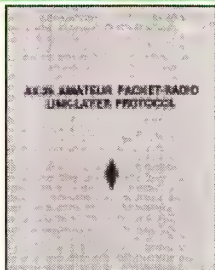
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In the five years since the ARRL first published *Your Gateway to Packet Radio*, interest in packet has exploded! To keep up with the expanding interest and evolving technology, the second edition contains 73 more pages — and nearly 50 percent of the original material has been revised. Newcomers will still find the basics on installation and operating procedures.

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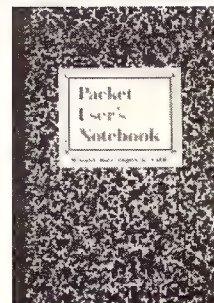
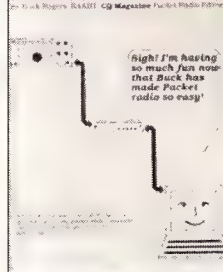
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### THE PACKET USERS NOTEBOOK

By Buck Rogers, K4ABT. This 125 page book is published by CQ Communications Inc. It is an ideal first book on Packet Radio. Chapters cover • Operation • 'Quick Connect' • The origin of packet • Getting started in packet • Packaging the packet terminal • Packet controller • Configuration: standards and protocols (RS-232C, RS-422A, RS-423A, RS-449, CCITT V.24 and AX.25 • Flow control • Hardware versus software • HF packet with a different twist • Modes and speeds • FSK, PSK and MSK • Programmes • Pictures and PBBS • Glossary • Interconnections — Transceiver to TNC • Interconnections — Computer to TNC

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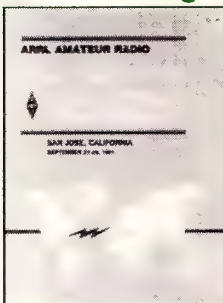
The presentations made at the ARRL Radio Computer Conference (Packet Radio etc.) have been published by the ARRL, and are now available in 6 volumes. The 9th conference of 1990 is now out of print.

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From the RSGB this book is written by Dave Coomber, G8UYZ and Martyn Croft, G8NZU, and was published in 1991.

This light-hearted introduction to the exciting new world of packet radio will help any beginner to get started with the minimum of fuss. Detailed, practical advice on connecting equipment followed by a guide through the maze of configurations possible. Then sample logs of contacts with various types of 'mailbox' are included to help you get the best out of the network. Much reference information is also included as a handy supplement to your equipment manuals. If you are a potential packeteer, this book is for you!

Everything in this book is just as applicable in Australia as in the UK.

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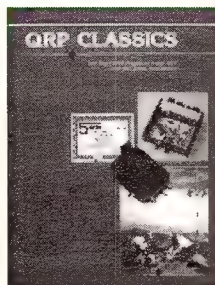


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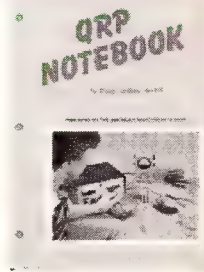
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### QRP NOTEBOOK

You can work the world with 5 watts or less. In this book Doug DeMaw, W1FB, presents construction projects for the QRP operator, from a simple 1-watt crystal-controlled transmitter to more complex transceiver designs. Rather than simply presenting a collection of completed units Doug guides you through the projects 'building-block' style. This way you gain an understanding of how the circuits operate and learn how the building blocks might be put together in other configurations. This book is packed full of useful and interesting information on QRP equipment and operation. 11" x 8.5" 80 pages.

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### G-QRP CIRCUIT HANDBOOK

The first of two books from the G-QRP Club of the UK. Compiled by the Rev. George Dobbs, G3RJV, from the G-QRP Club journal, SPRAT 1974-1982. This large sized book (210 x 300mm) contains 94 projects and practical circuit ideas, spread over three chapters: • Transceivers, Transmitters and Receivers • Station Equipment • Circuit Ideas.

If you like construction, and want to build some simple circuits that work, then this is the book for you. It is a pot-pourri of eight years of the best articles that have appeared in SPRAT.

All projects are well documented with parts lists (most parts are obtainable from Stewart Electronics), with PCB layouts where applicable.

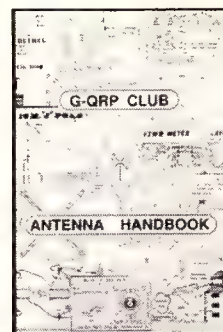
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### G-QRP ANTENNA HANDBOOK

The second book from the G-QRP Club of the UK, compiled and edited by P. Linsley, G3PDL and T. Nicholson, KA9WRI/GWOLNQ. A compilation of Antenna, Matching Units, and associated articles from SPRAT, the journal of the G-QRP Club. First edition 1992. A large book, 210 x 300mm, of 155 pages. The book is divided into several sections: • Antenna Matching Units and Test Equipment • HF Beam Antennas • HF Wire Antennas • HF Vertical Antennas • HF Loop and Restricted Antennas • Antennas for the VHF Bands • Appendices.

Over the years articles have been submitted, on a wide range of topics, in various forms and many of these are not written by the folks who write almost professionally for the larger magazines. They contain the experiences and words of wisdom that are often only circulated by word of mouth at local clubs. We are sure you will find these antenna articles most absorbing.

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## ANTENNA BOOKS

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The 16th edition is certainly big (210 x 270mm and 35mm thick) and is also printed on a much higher quality paper than the previous edition.

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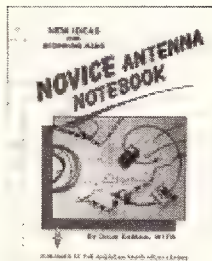
Doug DeMaw W1FB ARRL

The *Novice Antenna Notebook* tells how antennas operate and what affects their performance for long and short distance communication. The effects of antenna height above ground are explained as is when it is desirable to use radials and other ground systems. Matching the antenna to the feedline and the transmitter are thoroughly covered. With this book you can choose which wire, vertical or beam antenna design suits your needs and you'll be ready for all the fun of seeing that the antenna you put up really works!

You don't need to be a mathematician in order to duplicate the standard antenna designs presented, nor do you have to be a mechanical engineer to build the antenna supports shown. 6" X 11" 129 pages

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### W1FB's ANTENNA NOTEBOOK

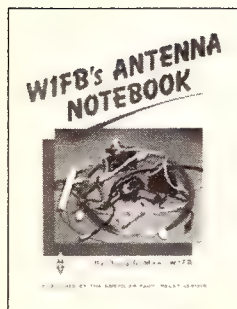
Doug DeMaw W1FB ARRL

You will find no high-level math in this publication. You will find some simple equations where they are necessary to explain a concept or to calculate the length of an antenna element and its matching section. Explicit drawings with numerous labels are used in an effort to clarify the illustrations to the fullest measure.

Descriptions of exotic gain antennas are not included. They may be found in the *ARRL Antenna Handbook*. For the most part simple wire and tubing antennas that can provide satisfactory performance for a host of operating objectives are emphasised. Another objective of this text is to dispel some of the common misconceptions about antennas that are passed along over the air and at hamfests. Free advice is not always accurate, despite the good intentions of the giver who offers his assistance! 128 pages 200 x 280mm

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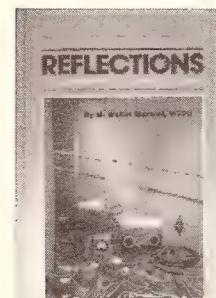
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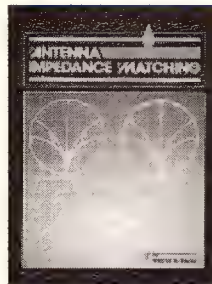
### ANTENNA IMPEDANCE MATCHING

Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. A properly matched antenna as the termination for a line minimises feed-line losses.

Complex matching networks can be developed using the Smith Chart, and no special expertise is needed. In a typical situation both the antenna impedance and the transmission line impedance are known, the designer simply moves the antenna impedance points on the Smith Chart to find the most effective matching network. There is no mystique involved in designing even the most complex multi-element networks. Instead a logical step-by-step procedure is followed, as discussed within the pages of this book. With an understanding of this information, antenna engineers and dedicated amateurs alike will find it a relatively simple task to design networks that will yield optimum performance.

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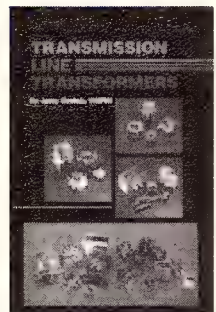
Includes some 100 new transformers for the second edition, many interesting and unexpected designs, using both the Ruthroff and Guanella's approaches.

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- The Ruthroff Analysis • High Frequency characterisation
- Transformer Parameters for Low and High-Impedance applications • 3 chapters on Unbalanced-to-Balanced transformer designs • Baluns • Multi-match Transformers • Material and Power Ratings • Simple Test Equipment • Hints & Kinks
- Selecting Ferrites • Winding Transformers • Constructing low-impedance coaxial cable. Stewart Electronics stocks many of the ferrite materials used in this book, 150 x 230mm hard bound

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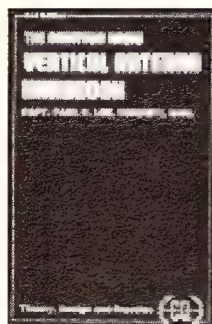


### The VERTICAL ANTENNA HANDBOOK

This book contains 20 chapters on the design and building of vertical antennas. • Optimum antenna design for DX • Basic principles of vertical antennas • Base impedance and methods of feeding and matching • Short vertical antenna considerations • Directional vertical antenna design • Theoretical aspects of vertical stacking broad-band vertical antenna design • Broad-band and vertical antenna configurations • Designing a specific directional vertical antenna including feed system • Using an equilateral triangle configuration for a simple directional array • The operation and design of the folded unipole antenna • The effects of earth on the efficiency of radiation and vertical pattern • Several practical designs are included.

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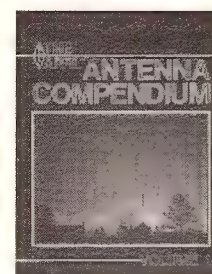
### The ANTENNA COMPENDIUM Volume 1

There is a wealth of material between these covers, and on a variety of antenna subjects. If you have a serious interest in antenna design or construction, you'll likely find something here that is right up your alley.

This collection contains twenty seven papers on a range of antenna topics including chapters covering • Quad and loop antennas • Beam antennas • Log periodic array • Multiband antennas • Vertical antennas • Antennas of reduced size • Antenna construction and installation • General antenna and transmission line information. 200 x 280mm 175 pages

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Like its predecessor, Volume 2 contains all brand-new material. Because antennas are a topic of great interest among radio amateurs The ARRL continues to receive many more papers on the subject than can be published as articles in QST. These papers have been collected here and combined with solicited material. None of this material has appeared in print before. Whether you have only a casual interest in antenna construction, or a serious interest in understanding fundamental theory, you'll most likely find something to stimulate your thinking.

Six papers in this book contain listings of BASIC programmes suitable for use with an IBM compatible computer. The programmes aid in performing various design tasks associated with antennas, as described in those six papers. We offer a 5.25" (360K) diskette as an optional supplement to this volume. The disk contains 11 BASIC programs in ASCII text format and one compiled Pascal corresponding to its BASIC counterpart.

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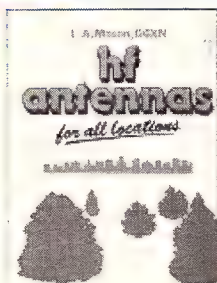
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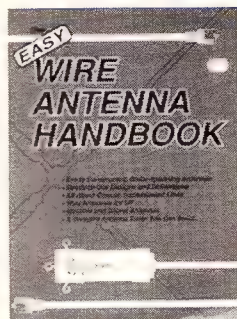
### HF ANTENNAS FOR ALL LOCATIONS

HF Antennas for All Locations by Les Moxon, G6XN, is renowned worldwide as probably the most in depth look at practical amateur radio HF antennas available. Sometimes controversial, but always helpful and encouraging to the experimenter, the author guides the reader through the theory of HF antennas with the minimum of headaches. The book is not just theory, however. Many practical designs are given, a large proportion of which are unique to this book. Whether you throw a piece of wire out of an upstairs window, or have four elements on 7MHz you cannot fail to be fascinated by this book. 7" x 9.5" 280 pages

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### The easy WIRE ANTENNA HANDBOOK



The inexpensive path to successful DXing! What's the least expensive and most effective way to equip your new transceiver, QRP rig, or classic transmitter and receiver setup for worldwide amateur radio communications? Use a home made wire antenna, naturally! This 1992, 220 x 228mm, 112 page book by Dave Ingram, K4TWJ, is dedicated to fulfilling that exact purpose. It's chocked full of ready-to-use designs and dimensions on both 'basic' and 'gain' antennas. There is information on hidden and disguised antennas, tuners and balun's, SWR meters, noise bridges, converting any antenna's dimensions to your favourite HF band, and more—much more!

This book's contents are 'user oriented' rather than technical, it features large diagrams and easy-to-read text, and we're confident it will spend more time on your station's desk than collecting dust on your library shelf.

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### HF ANTENNA COLLECTION

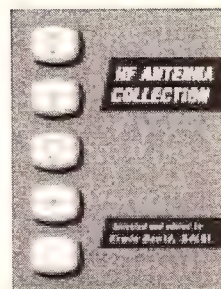
A collection of the best articles from *Radio Communication* from 1968 to 1989, and other information useful to the HF antenna builder. Selected and edited by Erwin David, G4LQI, first published in 1991, (180 x 245mm) with 233 pages.

An invaluable collection of outstanding articles and short pieces which were published in the RSGB monthly magazine *Radio Communication*. As well as ingenious designs for single-element, beam and miniature antennas, there is a wealth of information on ancillary topics such as feeders, tuners, balun's, testing, modelling and the mechanics of mounting an antenna safely. This book could just supply that vital idea for your next antenna project.

Contains nine chapters and six appendices.

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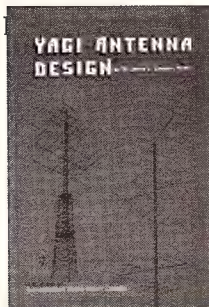


### YAGI ANTENNA DESIGN

*Yagi Antenna Design* is based on the series in *HAM RADIO Magazine* by the late Dr. James L. Lawson, W2PV. Jim designed and built a highly competitive and successful amateur radio contest station. The 210 pages in this hard bound book cover the following subjects • Performance calculations • Simple Yagis • Performance optimization • Loop antennas • Ground effects • Stacking practical designs • Designs for 7 through 28 MHz. Copyright 1986, 210 pages

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### PHYSICAL DESIGN of YAGI ANTENNAS

This hard bound book published by the ARRL in 1992 by Dr. David B. Leeson, W6QHS, provides the tools here to design and build robust Yagi antennas, using sound mechanical engineering principles. Leeson shares in detail his procedures for determining mechanical stress from wind and ice on elements, booms and masts. He includes abundant information on hardware and assembly techniques for survivable Yagi antenna systems. The electrical significance of the resulting physical design is also treated thoroughly.

You need no longer fear the consequences of wind and ice storms on your antenna. With this information you can build or 'beef up' existing Yagis so, like Leeson's, they will function in winds of 160 kph and beyond.

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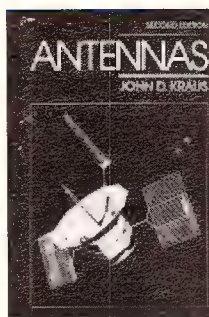


### ANTENNAS John D. Kraus W8JK

The 2nd edition of *ANTENNAS* by John Kraus is the bible on antennas. As with the first edition, physical concepts are emphasised which aid in the visualisation and understanding of the radiation phenomenon. More worked examples are given to illustrate the steps and through processes required in going from a fundamental equation to a useful answer. This new edition stresses practical approaches to real-world situations and much information of value is made available in the form of many simple drawings, graphs and equations.

Following a brief history of antennas in the first chapter to set the stage, the next three chapters deal with basic concepts and the theory of point sources. These are followed by chapters on Linear, Loop, Helical, Biconical and Cylindrical antennas. Then come chapters on antenna arrays, reflectors, slot, horn, complementary and lens antennas. The last four chapters discuss broadband and frequency independent antennas, for special applications including electrically small and physically small antennas, remote sensing, radar scattering and measurements. The appendix has many useful tables and references. Hard bound 892 pages

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### PRATICAL ANTENNA HANDBOOK

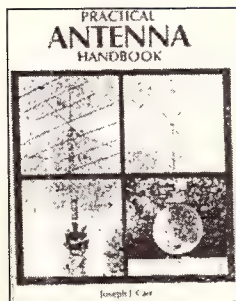
The *Practical Antenna Handbook* by Joseph J. Carr, first Edition 1989, is now in stock at Stewart's Bookshop. It covers all frequencies from 160 metres to UHF and Microwaves. It starts off with chapters on propagation and transmission lines. The transmission line chapter contains many no-nonsense equations, and that's really all we need to understand and construct transmission lines. Smith charts are also covered. Without an understanding of these, stubs and matching sections become very difficult.

There is a chapter on antennas for town-house and apartment dwellers. Many practical construction techniques are described and there is a very good section on grounding. The computer programmes for antenna design section is very informative and there is plenty of information for hackers.

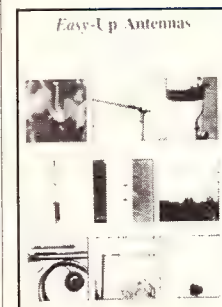
There is a lot of information on ways of keeping RF out of the shack and of where those high voltage nodes are.

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### EASY-UP ANTENNAS for Radio Listeners and Amateurs



Would you like to learn how to construct low-cost easy-to-erect antennas? Written by Edward M. Noll, W3FQJH, in 1988 162 pages (210 x 280mm) one of the leading experts in the radio and electronics field, this comprehensive handbook contains all the latest antenna design and construction tips, and tools you need to build effective, inexpensive antennas that work and stay up. You'll find that this handy reference:

- Covers basic, do-it-yourself antennas for short wave broadcast, FM broadcast, MW, LW, utilities for present and prospective amateurs and scanner listeners
- Features basic construction procedures for both receive and transmitting antennas
- Includes information on dipole variation, vertical variations, beams, long wires and other special types and configurations
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- Discusses advanced antenna designs, including beams, phased elements and other types
- Provides information on band frequencies, time considerations and sources of data.

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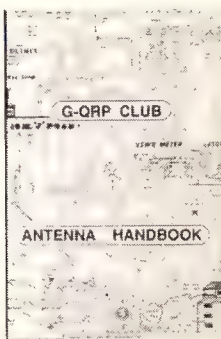
### G-QRP ANTENNA HANDBOOK

The second book from the G-QRP Club of the UK, compiled and edited by P. Linsley, G3PDL and T. Nicholson, KA9WRI/GW0LNQ. A compilation of Antenna, Matching Units, and associated articles from *SPRAT*, the journal of the G-QRP Club. First edition 1992. A large book, 210 x 300mm, of 155 pages. The book is divided into seven sections: • Antenna Matching Units and Test Equipment • HF Beam Antennas • HF Wire Antennas • HF Vertical Antennas • HF Loop and Restricted Antennas • Antennas for the VHF Bands • Appendices.

Over the years articles have been submitted, on a wide range of topics, in various forms and many of these are not written by the folks who write almost professionally for the larger magazines. They contain the experiences and words of wisdom that are often only circulated by word of mouth at local clubs. We are sure you will find these antenna articles most absorbing.

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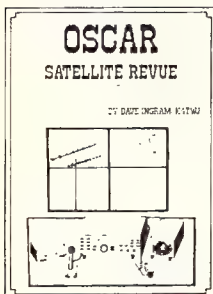
2nd Edition 1992. The second quarter-century of OSCAR satellites has begun. We've collected the best of the amateur Satellite News column and articles out of 31 issues of QST to better document this new era. You can use this handy volume alone or as a supplement to the previously published *Satellite Experimenters Handbook* (Stewart Stock # BX177). You'll find the latest information on OSCARs 9 through 13 as well as the RS satellites. Operation on Phase 3 satellites (Oscar 10 and Oscar 13) is covered in detail. The popular four-part series, *Adventures in Satellite DXing and Working OSCAR—the Basics*, are included. Timely information appears on the use of digital modes, tracking antennas, RUDAK, microcomputer processing of telemetry & where to find additional OSCAR information. 95 Pages 8.5" x 11"

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Martin R. Davidoff, K2UBC, 2nd edition, published 1990. You'll find this expanded and revised 2nd edition of *The Satellite Experimenters Handbook* a fascinating new look at how you can put orbiting spacecraft to practical use. Discover the basics of satellite communications, the latest series of spacecraft and the antennas and radios needed to hear them or communicate through them. Explore the sample problems and tutorials on calculating when a satellite will be in range. Aside from amateur radio satellites, this edition discusses weather, TV-broadcast and other spacecraft. 11" x 8" 350 pages.

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### OSCAR SATELLITE REVUE

*Oscar Satellite Revue* by Dave Ingram, K4TWJ, is an anthology of CQ magazine articles on setting up various types of OSCAR stations and operating via the amateur radio satellites. Each article is followed by a new, updating addition, then ready to use frequency conversion charts for all satellite modes and tracking notes for OSCAR 13. OSCAR 10. Japanese JO12 and Russian RS10/RS11 amateur radio satellites are featured. There's also a quick-start guide for newcomers and a large equipment review section. This guide takes you from set-up to success and every part is written in a non-technical easy-to-understand language. No confusing calculations or complex descriptions. See how easy it is to join the fun via amateur radio satellites. 11" x 8.5"

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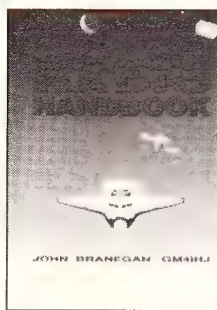
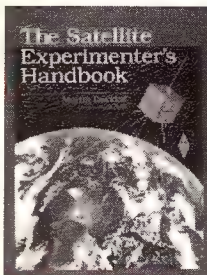
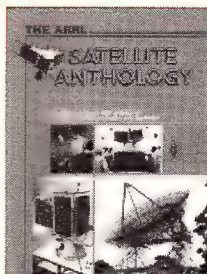
Proceedings of the 6th AMSAT-NA Space Symposium & Annual Meeting held November 11-12, 1988, at Atlanta Georgia, a total of 18 papers including many drawings, photographs & construction details. Contents • Polar bridge 'wrapup' • AMSAT's Microsat/Pacsat programme • DSP project update • Toward the future in the amateur satellite programme • Satellite orbital characteristics during the pre-entry phase • FUJI-OSCAR12 and the future Japanese satellite project • The AMSAT Phase IV project • The AMSAT/TAPR DSP 1 project • Hardware Design • Microsat project - Flying CPU hardware • Unified file management scheme for the multi-Microsats • The Mt. Foxaway Nth Carolina microwave beacons & linear translator.

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### SPACE RADIO HANDBOOK

Space exploration by radio is exciting and is open to anyone! Equipped with receivers and transmitters, computers and telescopes, thousands of individuals, schools and clubs are following everything that goes on in space. Some are communicating via satellites or by bouncing signals off meteor trails or even the moon, some are listening to cosmonauts or taking part in space experiments, while others are listening to radio signals that have taken millions of years to come from distant galaxies.

*Space Radio Handbook* shows you how it is done, and the equipment you will need. It covers the whole field of space radio communication and experimentation, including meteor scatter, moonbounce, satellites and simple radio astronomy. A valuable feature is a collection of experiments of interest to those wishing to explore the many educational possibilities. If you are ready to use radio to explore beyond the atmosphere, let this book be your companion.

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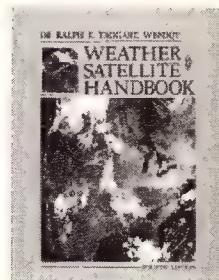
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Dr Ralph Taggart, WB8DQT 4th Edition ARRL

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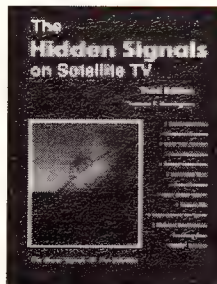
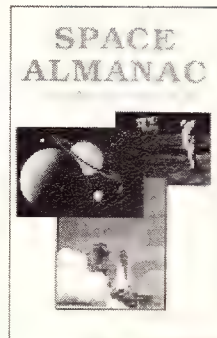
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By Thomas Harrington contains 238 Pages (210 x 280mm)

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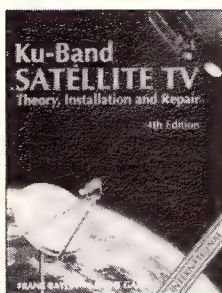


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## SATELLITE BOOKS - MORSE CODE - Radio Teletype

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by Frank Baylin and Brent Gale



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The book explores the background of Ku-band reception equipment with a detailed survey of frequency allocations for broadcast satellites around the globe. The chapter on TVRO components includes a study of scrambling and encryption methods. Retrofitting Ku-band components onto C-band TVROs is discussed with a step-by-step examination of multiple-receiver systems and distribution networks. Existing North American, Soviet, European, Japanese and Australian Ku-band broadcast systems are outlined and, finally, a consistent and comprehensive method of troubleshooting and repairing TVROs, detailed description of different types of test equipment.

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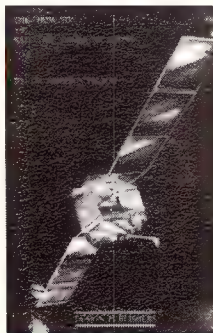
### The "HOW-TO" of SATELLITE COMMUNICATIONS

This new book by Dr. Joseph Pelton, a seasoned veteran of the industry, is a brilliant excursion through the world of satellite communications. For any serious user of satellite services it gives even a novice the knowledge to design, evaluate and purchase any type of data, audio or video services. Topics include:

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- The fundamentals of earth station operation
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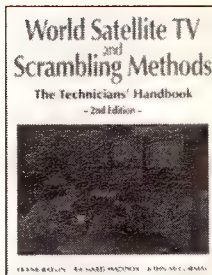
### WORLD SATELLITE TV and SCRAMBLING METHODS

by Frank Baylin, Richard Maddox, John McCormack

This thorough text is a must-buy for technicians, satellite professionals and do-it-yourselfers. The design, operation and repair of satellite antennas, feeds, LNBs, receivers and demodulators are examined in detail. An in-depth study of scrambling methods and broadcast formats is a backdrop to a discussion of all American and European current satellite TV technologies including the VideoCipherII, Oak Orion, FilmNet, Sky Channel, EuroCypher, D2MAC, BSB and Teleclub PayviewIII. Circuit and block diagrams of all components are presented and clearly explained throughout the book. This expert guidance on testing, servicing and tuning is complemented by a wealth of detailed illustrations. 356 pages, 220 x 280mm, over 200 photos, diagrams, wiring, schematics, tables and appendices.

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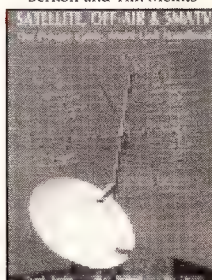


by Frank Baylin, Steve Berkoff and Tim Meints

### SATELLITE OFF-AIR & SMATV

A comprehensive study of satellite master antenna TV (SMATV) systems. This thorough manual clearly presents the concepts behind private cable systems as well as technical details of construction and operation. Private cable systems are installed in apartment complexes, hotels, motels, hospitals, caravan parks, and auditoriums as well as in many other multi-unit environments.

This book explores the background and history of this rapidly evolving field. Three chapters are devoted to the details of the site survey, planning and design phases of a private cable system. Off-air and satellite headends and all components from antennas to processing and mixing electronics are studied in detail. The chapter on distribution systems explores the components required to supply a high quality signal to every television set. Numerous examples are provided as illustrations of each stage of design. Complex design issues such as inserting locally originated signals, two-way services and satellite audio reception are also studied. The chapter on systems operations presents methods to manage one or more systems as well as a logical approach to troubleshooting. 258 pages, 215 x 280mm.



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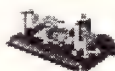
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Collectors Guide



### VIBROPLEX COLLECTORS GUIDE

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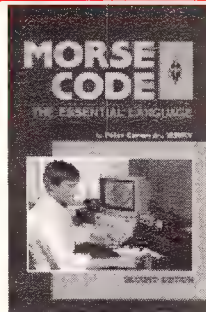
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L. Peter Carron W3DKV

- Tells of the evolution from the straight key to computers
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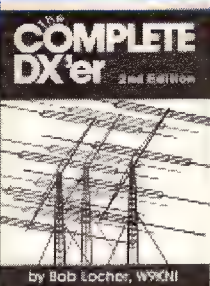
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As modified by the ARRL board January 1991 and published May 1992 ARRL DXCC Countries List and rules for DXCC certificate. Contains DXCC award application form • An up-to-date listing of the DXCC countries • A table of all deleted countries • A table of the allocation of international call sign series • Rules for obtaining the DXCC award • Complete tables of all countries with provision to record countries worked, mode and frequency

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By Jim Kearman, KR1S.

The newcomers guide to DXing or how to work your first hundred countries. A very readable little volume full of useful hints about how to work the DX and not make enemies! Discusses QSLing, equipment, antennas, propagation and lots more in a very easy to understand way.

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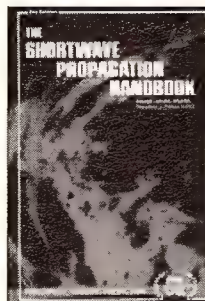
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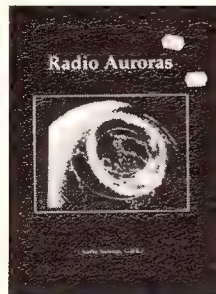


### THE SHORTWAVE PROPAGATION HANDBOOK

2nd Edition—Revised 1990 George Jacobs and Theodore J. Cohen. The two leading authorities on propagation have teamed up to produce what will be the definitive work on this fascinating subject. For the first time any where, propagation is explained in simple language whereby the average reader can fully understand, use, and produce their own propagation data. This book truly is must reading for the radio amateur, short wave listener and all others who make use of the short wave radio spectrum.

Information contained in this book should enhance significantly one's ability to understand and to make better use of, the ionosphere. We feel that this book is one of the most useful—and usable—volumes available today on the subject of propagation. 150 x 200mm, 150 Pages

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### RADIO AURORAS

by Charlie Newton G2FKZ published by the RSGB 1st Edition 1991, tells all you would ever want to know about amateur radio communication by means of Auroral propagation. This book gives a readable account of what causes Auroras, how they are forecast and how they to best use them to work DX. There are seven chapters and an index, titles included • How an Aurora begins • The sun's part • Magnetic fields of the Earth and Sun • How does an Aurora come about • The problems of field-aligned propagation • Auroras on bands other than 2 metres • An analysis of amateur work during cycle 21 and comparison with cycle 19 • The big storm of 13/14 March 1989. This book is must reading for anyone interested in an in-depth study of radio wave propagation.

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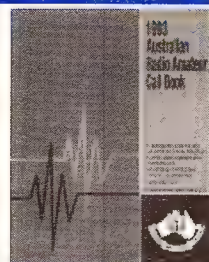
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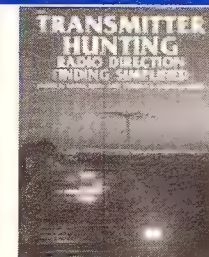
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### TRANSMITTER HUNTING

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In this book by Joseph D. Moell, K0OV & Thomas N. Curlee, WB6UZZ, you'll find out how direction finding can be both fun & practical. Combine techniques taught in this book with those used by search and rescue teams and you learn how RDFing can even save lives. Explore the challenge of hidden transmitter hunts and locating causes of accidental & malicious interference to Amateur communications. Find out how to get started, directional antennas, Doppler RDF units. S meters, direction finding from fixed sites, VHF mobile techniques, T-hunting from orbit, hunting below 50MHz. How to be the 'Fox' and triangulation using two BASIC programmes. 323 pages 7" x 9"

Order code BX222 \$35.90





# Stewart's Bookshop

## Help For Beginners

## ATV BOOKS

### FIRST STEPS IN RADIO

This book is a reprint of the wide-ranging *First Steps in Radio* series by Doug DeMaw, W1FB published in 1984 and 1985 in QST. The entire QST series is reproduced here. You will find this book a great help for newcomers to learn the electronic theory needed for licensing exams and to gain some insight into how radio equipment works. In *First Steps in Radio* you will find basic explanations of circuit components, see these components assembled into practical circuits, and see how the circuits make up your radio gear. Additional segments cover antennas, propagation and radio frequency interference at a beginner's level.

Although you may never 'roll your own' equipment, you will gain an understanding of what goes on behind the front panel and take pride in that knowledge.

Order Code BX385 \$12.00

### HELP FOR NEW HAMS

Most of us have come across newly licensed amateur radio operators whose first-and-only thought is to get on the air and make contacts. They'll likely earn WAC in their first couple of months of operating and will often go on to make their mark on our hobby — with little or no assistance. On the other hand, many of us have known amateurs who fail to renew their licenses. They may have been full of enthusiasm at first, but for one reason or another it soon wore off. The ARRL wrote to a sampling of these folk, asking them why. Many told us they had never made a contact. They had questions about every aspect of Amateur Radio. They wanted someone to answer their questions and to help them choose, install and operate their first stations. Doug DeMaw, W1FB wrote this new book to help these new hams get started in amateur radio.

Order Code BX308 \$20.00

### NOVICE NOTES: The Book

A selection of articles for the beginner from the popular QST series. This 65 page book 11 x 8.5" contains 15 articles on operating and 7 articles on equipment and antennas. Some of the many articles are:

- A fresh look at CW 'The case for code'
- Plain talk about voice operation
- Keeping a station log • Paper tiger (QSLing)
- Contests and you • Awards chasing • Are you ready for 10 metre E skip? • Tales of triumph
- Cleaning up your act in the ham shack
- Life after your license • Receiver filters improve reception
- Antenna tuners: Are they necessary, and much more

Order code BX298 \$12.00

### AUSTRALIAN RADIO THEORY HANDBOOK

This NEW 1991 EDITION by Fred Swainston has been written to cover the AUSTRALIAN Department of Communications syllabus for the Novice and Amateur Operator Certificate of Proficiency. It contains the theory necessary to pass the Certificate of Proficiency and is written so as to be concise and easy to understand. The intention is to assist those who have no knowledge of radio theory or electronics. The subjects in the book have been presented in a logical sequence with test questions at the end of each chapter, covering key points in the text. A separate chapter on mathematics required for amateur examinations has also been included, because this area often presents a problem to those studying radio theory. Sample examination papers are included. 341 pages 1991 11" x 8"

Order code BX265 \$42.95

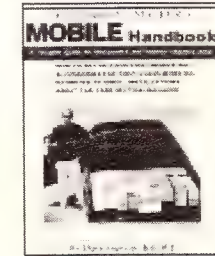
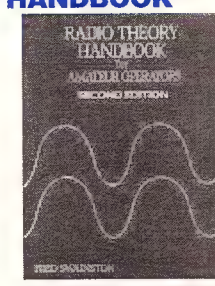
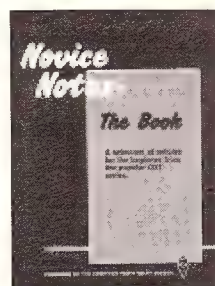
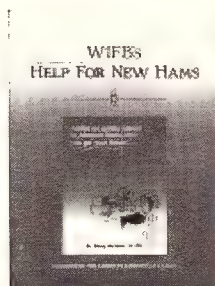
### MOBILE HANDBOOK

Mobiling is more popular today than ever before, and this all-new book is your complete guide to all the action. Included chapters highlight HF, VHF, 10 Meters, FM, QRP and QRO, antennas, tuning aids, and much more. There are also special sections featuring "how to" notes for newcomers, DXing on the open road, assembling your own HF or VHF antenna, reducing ignition noise, minimizing RFI, and a super guide to car care. Also described is a unique plan to be used by the young amateurs and retirees alike.

Order Code MFJ33 \$24.95

### AMATEUR RADIO FICTION from the ARRL

CQ Ghost Ship	BX204	\$10.50
Death Valley QTH	BX205	\$10.50
CQ Brings Danger	BX206	\$10.50
Grand Canyon QSO	BX207	\$10.50
Murder By QRM	BX206	\$10.50
SOS At Midnight	BX209	\$10.50
Ideal presents for both young and old		



### THE ATV COMPENDIUM

Edited by Mike Wooding, G6IQM, for The British Amateur Television Club

For something approaching the past decade the BATC has been publishing handbooks, dealing exclusively with the world of amateur television. These publications have proved to be very popular with the membership throughout the years. This new book will serve to inform those interested in amateur television, practically those of you involved in home construction. Includes projects that use of 'state-of-the-art' techniques and devices, without precluding those who do not own sophisticated test equipment or have degrees in mechanical engineering.

Order code BX270 \$17.50

### An Introduction to Amateur TV

A new book from the British Amateur Television Club, edited by Mike Wooding, G6IQM and Trevor Brown, G8CJS. Eight chapters in 154 pages, full of information and circuits on theory and construction.

Order Code BX389 \$20.00

### The Best of CQ-TV volume 2

Edited by Mike Wooding, G6IQM, published by the British Amateur Television Club in 1989, this 100 page book is full of ATV projects, 29 in all.

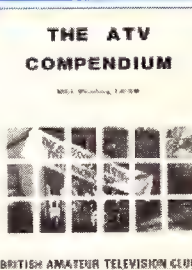
Order Code BX273 \$17.50

### HISTORY

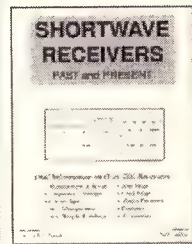
#### SHORT WAVE RECEIVERS PAST AND PRESENT

By Fred Osterman This book contains vital information on over 200 shortwave receivers made over the last 25 years. Includes manufacturer and model... circuit type... year manufactured... size, weight and voltage. Features... value new... value used... modes received... accessories. Most receivers are shown with photos. A great guide to the used receiver market. This book provides the radio hobbyist with concise information on the values, features, and performance of current and former short wave radios. This book attempts to offer key facts on all important short wave radios manufactured in roughly the last 25 years that frequently appear on the used radio market. The prices shown are for the US market but will be a good guide for use in Australia. 8.5" x 11" 104 pages

Order code BX253 \$22.00



BRITISH AMATEUR TELEVISION CLUB



### 200 METERS and DOWN

THE STORY OF AMATEUR RADIO by Clinton B. DeSoto was first published in 1936 by the ARRL. At this time Mr. DeSoto, then a radio amateur and a student of journalism, started to do what no one had ever done for amateur radio — to write its full history for the benefit of generations to come. This volume has been reprinted exactly as it was in 1936 and is an invaluable source of amateur history. 6" x 9" 184 pages

Order code BX198 \$8.00

### The BRIGHT SPARKS OF RADIO

This new book by G. R. Jessop, G6JP, published by the RSGB, 1990. Covers the heritage years of radio from Marconi to the 'secret listeners' of 1939-45. High quality, hard bound with many photographs and diagrams.

Order Code BX394 \$44.00

### GOLDEN CLASSICS OF YESTERYEAR

Remember the 6L6 rigs, Heathkit DX100, Collins KWM-1, Globe Scout, Hallicrafters, RME, Hammarlund, National HROs, Eimac tubes, E.F. Johnson, WWII rigs — Bugs by Vibroplex, McElroy Dow Key ...

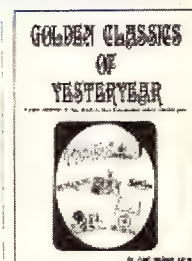
All these famous names plus many more you'll recognize are in "Golden Classics of Yesteryear". It's all amateur radio in content and it's jam packed with real life tales, transmitters, receivers, favourite circuits, telegraph keys, bugs and other ham topics. EASY-TO BUILD weekend projects; transmitters, receivers and other projects — from the 1920s, 30s, 40s and 50s are included. You'll see how to build a classic 'Tailender' — an early DX memory keyer — that requires no power supply or other electronic parts and works like a champ. 11" x 8.5" 60 pages

Order code MFJ30 \$20.50

### Fifty Years of ARRL

In May 1914 a small band of radio amateurs led by the late Hiram Percy Maxim, W1AW and Clarence Tuska started a national organisation and named it the American Radio Relay League. Since that time the story of amateur radio has been the history of the league, the chronicle of amateurs working together. In 1946 the Golden Anniversary of the league, its magazine, QST, covered this tale in serial form. This material is now gathered here as a historical reference, supplementing but not replacing, the only other comprehensive history, *Two Hundred Metres and Down* by Clinton B. DeSoto. Through these pages 'Old Timers' can relive their own amateur experiences and 'Young Squirrels' can learn the fascinating tale of amateur radios early years and appreciate the heritage of amateur radio so painstakingly built up. 150 Pages 6" x 9"

Order code BX196 \$8.00





# Transmitting & Receiving tubes

1B3GT	\$14.40	6DR7	\$31.08	810	Cetron	\$167.88
1S2	\$5.60	6DS4	\$42.48	810	PENTA	\$215.50
1S5	\$6.40	6DT6	\$14.04	811A	PENTA	\$35.26
1N3	\$20.80	6DX8	\$17.16		Selected/Matched Pr	\$71.00
1U4	\$6.40	6EA8	\$14.04		Selected set of 4	\$140.36
1X2B	\$14.04	6EB8 / 6GN8	\$18.72	812A	PENTA	\$23.88
23Z9	\$28.08	6EH7	\$15.60		Matched Pair	\$114.86
2D21	\$14.04	6EM7 / 6EA7	\$18.72	813	PENTA	\$93.12
25E5 / PL36	\$9.36	6EJ7	\$2.34		RCA	\$119.76
3GK5	\$14.04	6ES8 / ECC189	\$9.36	833A	PENTA	\$179.40
3Q4	\$9.36	6EW6	\$14.04	833C	PENTA (graphite)	\$227.40
5AR4	\$28.80	6FC7	\$2.34	872A	S/State Replacement	\$94.80
5U4GB / 5AS4A	\$37.44	6FQ7 / 6CG7	\$14.04	M2057	GE	\$59.88
5R4GY	\$25.90	6FY5	\$9.36	5763	GE/RCA/SYL	\$47.88
5Y3GT	\$17.16	6GH8A	\$28.68	5894	PENTA	\$107.52
6AG7	\$15.90	6GK5	\$18.72		GE/AMPEREX	\$119.52
6AH6	\$17.16	6GK6	\$23.88	6146B	GE	\$55.00
6AJ8	\$6.40	6GV5	\$2.34		Sel. Pr(Kenwood)	\$127.50
6AL3	\$5.62	6GV7	\$15.60	6973	PHILIPS	\$47.88
6AL5 / EB91	\$10.68	6GV8	\$7.80	7199	PHILIPS	\$45.88
6AM8A	\$14.04	6GW8 / ECL86	\$15.60	7558	ECG	\$43.00
6AN4	\$14.04	6HF5	\$35.88	7581 / KT66	GE	\$40.68
6AN8A	\$27.90	6HF8	\$106.80	8417	ECG/GE	\$45.48
6AQ5	\$8.32	6HG8	\$31.08	8873	EIMAC	\$879.00
6AQ5A / 6HG5	\$17.16	6HS8	\$14.04	8874 / 3CX400A7	EIMAC	\$725.45
6AQ6	\$9.36	6J5GT	\$21.84	8875	EIMAC	\$747.89
6AQ8 / ECC85	\$17.16	6JB6	\$23.40	8877/3CX1500A7	PENTA	\$1390.80
6AR5	\$23.88	6JB6	\$9.36	8908	GE	\$59.88
6AT6	\$9.36	6JH8	\$115.08	8930	EIMAC (surplus)	\$691.20
6AU4	\$12.00	6JS6C	\$31.08	8950	GE	\$49.80
6AU6	\$14.30	6JS6C	\$48.60		Sel/Mat Pr (Linear)	\$223.20
6AU6A	\$9.36	6JU6	\$121.00		Sel/Mat 4 (Linear)	\$223.20
6AV6	\$11.88	6JW8	\$138.50		Sel/Mat Pair (Swan)	\$116.40
6AW8A	\$14.04	6KD6 (short)	\$96.58	8981	GE	\$59.88
6AX5GT	\$21.58	6KD6	\$14.04	3-500Z	PENTA	\$237.36
6AX5GTB	\$12.48	6KE6	\$45.48		EIMAC	\$323.40
6BA6	\$14.04	6KE6	\$105.36	3-500ZG	HD Graphite anode	\$263.90
6BA7	\$21.84	6KE6	\$210.72	3-1000Z	Eimac / Amperex	\$1529
6BA8	\$9.36	6KE6	\$212.70	4-65A	EIMAC	\$210.00
6BC8	\$17.16	6KE6	\$129.70	4-400C	EIMAC	\$383.88
6BD6	\$9.36	6KV6	\$190.08	4-400CG	Penta HD gr. anode	\$425.90
6BE6	\$15.60	6L6GB / GC	\$105.50	3CX100A5 / 7289	EIMAC / GE / RCA	\$175.78
6BH6	\$18.72	6L6GT	\$20.28	3CX400A7 / 8874	EIMAC	\$725.45
6BH8	\$9.36	6LB6 Sel Pr	\$15.60	3CX800A7	EIMAC	\$815.88
6BK5	\$6.24	6LF6 / 6MH6	\$119.88	3CX1200A7	EIMAC	\$1127.88
6BK7B	\$9.36	6LQ6 / 6MJ6	\$43.89	3CX1500A / 8877	PENTA	\$1390.80
6BL8 / ECF80	\$10.92	6LQ6 Sel Pr	\$115.08		EIMAC	\$1606.80
6BL8	\$4.99	6LR6 Sel quad	\$40.68	3CX3000A7	EIMAC	\$1727.88
6BM8	\$4.52	6LR6	\$119.88	4CX250B / 7203	EIMAC	\$228.80
6BN5	\$39.00	6LX6	\$299.00		PENTA	\$186.95
6BN8	\$28.68	6LX8	\$47.88	4CX250R / 7580W	PENTA	\$335.88
6BQ5	\$7.80	6MJ6	\$119.88	4CX300A	PENTA	\$323.88
6BQ6	\$26.28	6N3	\$40.68	4CX350A	EIMAC	\$438.90
6BQ7A	\$18.72	6N8	\$14.04		PENTA	\$328.90
6BR5	\$21.84	6S2A	\$63.60	4CX1000A7	PENTA	\$935.88
6BR8A	\$9.36	6S4A	\$138.50	4CX1500B / 8660	PENTA	\$1188.00
6BU8	\$21.84	6SK7GT	\$276.98	4CX5000A	EIMAC	\$2387.00
6BW6	\$93.60	6SN7GT	\$6.40		PENTA	\$1738.00
6BX6	\$14.04	6SQ7	\$28.08	4CX10000D	PENTA	\$2304.00
6BY7	\$12.48	6U9	\$17.16	4X500A	EIMAC	\$1150.80
6BZ6	\$14.04	6V6GT	\$17.16	KT66		\$59.20
6CA4	\$19.97	6V9 / ECH200	\$34.32	KT88		\$78.40
6CA7	\$17.16	6X4	\$18.72			
6CA7	\$43.68	6X5GT	\$24.96			
6CB6A	\$14.04	6X8A	\$3.90			
6CD6GA	\$28.08	6Y9	\$23.40			
6CG7	\$24.95	6087	\$9.36			
6CG8A	\$2.34	12AQ5	\$19.08			
6CK6	\$46.80	12AT7A	\$8.64			
6CL6	\$28.20	12AU6	\$16.68			
6CM5	\$12.48	12AU7A	\$8.00			
6CM7	\$12.48	12AX7A	\$12.80			
6CQ8 / 6U8A	\$14.04	12BA6	\$16.68			
6CS6	\$14.04	12BY7A	\$32.40			
6CS7	\$14.04	572B / T160L	\$167.88			
6CW4	\$42.48	572B / T160L	\$354.60			
6CW5 / EL86	\$17.16	807	\$11.00			
6CW7	\$28.08					
6CX8	\$28.68					
6CZ5 / 6EM5	\$23.40					
6DJ8	\$9.36					
6DQ5	\$62.40					
6DQ6 / 6GW6	\$26.52					

## TRANSMITTING TUBES

Eimac and Penta Transmitting, Thyatron, and Magnetron Tubes carry manufacturers limited warranty against defective material and workmanship for 12 months. Defective tubes must be returned prepaid accompanied by original purchase receipt and failure report details. Surplus tubes have a 90 day limited warranty.

## TUBE BRANDS

The brands shown in this list are those that were available at the time of printing. Whilst every effort will be made to supply the brands listed, if you have a requirement that only *ONE* brand is acceptable then please note this condition on your order, otherwise we will assume that substitutes are acceptable.



# R.F. Power transistors & hybrids

## VHF & UHF (27-1000MHz) RF Power Transistors

Type	Po W	Freq Range	Gain dB	Package Type	per Each	Matched Pair
MRF207	1	G	8.2	T0-39	\$6.00	
MRF208	10	G	10	145A-09	\$39.60	
MRF212	10	F	9	145A-09	\$46.80	
MRF220	4	F	12	211-07	\$22.20	
MRF221	15	F	6.3	211-07	\$28.80	
MRF222	25	F	-	211-07	\$40.80	
MRF224	40	F	4.5	211-07	\$38.40	\$88.80
MRF226	13	G	9	145A-09	\$34.80	
MRF227	3	G	13.5	T0-39CE	\$7.20	
MRF229	1.5	E	10	T0-39CE	\$11.40	
MRF231	3.5	E	10	145A-09	\$40.80	
MRF233	15	E	10	145A-09	\$27.60	
MRF234	25	E	9.5	145A-09	\$56.40	
MRF237	4	F	12	T0-39CE	\$4.80	
MRF238	30	F	9	145A-09	\$38.40	\$88.80
MRF239	30	F	10	145A-09	\$40.80	\$93.60
MRF240	40	F	9	145A-09	\$39.60	\$88.80
MRF240A	40	F	9	211-07	\$39.60	\$88.80
MRF245	80	F	6.4	316-01	\$76.80	\$165.60
MRF247	75	F	7	316-01	\$59.40	\$130.80
MRF248	80	F	11.3	316-01	\$84.00	\$187.20
MRF250	50	F	4.4	316-01	\$48.00	
MRF260	5	F	10	T0-220CE	\$24.00	
MRF261	10	F	5.2	T0-220CE	\$25.20	
MRF262	15	F	6.3	T0-220CE	\$25.20	
MRF264	30	F	5.2	T0-220CE	\$30.00	
MRF309*	50	H	7	316-01	\$144.00	
MRF314*	30	D	10	211-07	\$57.60	\$132.00
MRF315*	30	D	10	145A-09	\$79.20	\$168.00
MRF315*	45	D	9	211-07	\$59.40	\$132.00
MRF315A*	45	D	9	145A-09	\$78.00	\$169.20
MRF316*	80	D	10	316-01	\$154.80	\$326.40
MRF317*	100	D	9	316-01	\$151.20	\$314.40
MRF321*	10	I	12	244-04	\$57.01	
MRF327*	80	H	7.3	316-01	\$148.80	\$312.00
MRF340*	8	D	13	T0-220CE	\$20.40	
MRF492	70	C	11	211-11	\$37.80	\$84.00
MRF497	40	C	10	T0-220CE	\$45.00	\$97.20
MRF515	.75	J	8	T0-39	\$6.00	
MRF555	1.5	J	10	317D-01	\$7.20	
MRF557	1.5	K	8.0	317D-02/2	\$12.60	
MRF559	0.5	K	8	317-01	\$5.40	
MRF607	1.75	F	11.5	T0-39	\$6.00	
MRF627	.5	J	10	305A-01	\$22.80	
MRF629	2	J	8	T0-39CE	\$7.80	
MRF630	3	J	9.5	T0-39CE	\$9.00	
MRF641	15	J	7.8	316-01	\$49.20	\$105.60
MRF644	25	J	6.2	316-01	\$55.20	\$120.00
MRF646	40	J	4.8	316-01	\$62.40	\$134.40
MRF650	-	I	-	316-01	\$84.00	
MRF648	60	J	4.4	316-01	\$74.40	\$158.40
MRF652	5	J	10	244-04	\$27.60	
MRF653	10	J	7	244-04	\$34.80	
MRF654	15	J	7.8	244-04	\$48.00	
MRF660	7	J	5.4	T0-220AD	\$31.80	
MRF752	25	J	8	249-05	\$52.80	
MRF754	8	J	6	249-05	\$70.08	
MRF843	15	K	7	244-04	\$50.40	
MRF843F	15	K	7	319-04	\$50.40	
MRF846	40	K	7	319-04	\$90.60	
MRF873	15	K	7	319-04	\$71.88	
MRF1946	30	F	10	211-07	\$36.00	
MRF1946A	30	F	10	145A-09	\$40.80	
MRF2628	15	G	12	244-04	\$24.00	
SD1278-1	40	F	8	211-07	\$33.00	\$72.20
SD1441	150	F	5	316-01	\$202.80	\$432.00
SD1477	100	F	6	316-01	\$119.52	\$264.00
2N3553*	2.5	F	10	T0-39	\$7.20	
2N3866*	1	H	10	T0-39	\$3.00	
2N4427	1	F	10	T0-39	\$3.00	
2N5090	2	F	13	145A-09	\$31.20	
2N5589	3	F	8.2	144B-05	\$31.20	
2N5590	10	F	5.2	145A-09	\$24.00	
2N5591	25	F	4.4	145A-09	\$34.80	\$81.60

Type	Po W	Freq Range	Gain dB	Package Type	per Each	Matched Pair
2N5641*	7	F	-	1440-05	\$38.40	
2N5642*	20	D	8.2	145A-09	\$39.60	
2N5643*	40	D	7.6	145A-09	\$45.60	\$100.80
2N5646	10	J	6.0	244-04	\$31.20	
2N5944	2.0	J	9.0	317D 02/2	\$26.40	
2N5945	4	J	8	244-04	\$24.00	
2N5946	10	J	6	244-04	\$30.00	
2N6080	4	F	12	145A-09	\$21.60	
2N6081	15	F	6.3	145A-09	\$26.40	
2N6082	25	F	6.2	145A-09	\$35.40	
2N6083	30	F	5.7	145A-09	\$35.40	\$78.00
2N6084	40	F	4.5	145A-09	\$35.40	\$78.00
2N6097 PNP	40	F	-	145A-09	\$48.00	
2N6255	3	F	7.8	T0-39	\$6.00	

## HF (2-30MHz) Power Transistors

Type	Po W	Package Style	Each	Matched Pair	Matched Quad
MRF401	25	145A-09	\$28.80		
MRF406	20	211-07	\$32.40	\$76.80	\$163.20
MRF412	80	211-11	\$52.80	\$53.00	\$264.00
MRF412A	80	145A-10	\$55.20	\$132.00	\$276.00
MRF421	100	211-11	\$57.60	\$124.80	\$254.40
MRF422*	150	211-11	\$86.40	\$187.20	\$393.60
MRF426	25	211-07	\$44.40	\$98.40	\$206.40
MRF426A	25	145A-09	\$51.60	\$105.6	\$235.20
MRF427**	25	145A-10	\$40.80	\$96.00	\$204.00
MRF428*	150	211-11	\$120.00	\$268.80	\$571.20
MRF429**	150	211-11	\$93.60	\$201.60	\$415.20
MRF433	12	211-07	\$26.40	\$62.40	\$132.00
MRF435*	150	211-11	\$343.20	\$720.00	
MRF448**	250	211-11	\$176.40	\$372.00	\$760.80
MRF449	30	211-07	\$54.00	\$117.60	\$244.80
MRF449A	30	145A-09	\$43.80	\$97.20	\$201.60
MRF450	50	211-09	\$32.40	\$74.40	\$153.60
MRF450A	50	145A-09	\$34.20	\$78.00	\$160.80
MRF453	60	211-11	\$40.80	\$94.80	\$199.20
MRF453A	60	145A-10	\$44.40	\$100.80	\$206.40
MRF454	80	211-11	\$33.60	\$76.80	\$158.40
MRF454A	80	145A-10	\$40.80	\$94.80	\$201.60
MRF455	60	211-07	\$27.00	\$61.20	\$127.20
MRF455A	60	145A-09	\$30.60	\$68.40	\$127.20
MRF458	80	211-11	\$48.00	\$110.40	\$228.00
MRF460	60	211-11	\$56.40	\$124.80	\$259.20
MRF464*	80	211-11	\$60.00	\$139.20	
MRF466*	40	211-09	\$45.00	\$111.60	
MRF475	12	T0-220	\$16.20	\$42.00	
MRF476	3	T0-220	\$9.60	\$26.40	
MRF477	40	T0-220CE	\$28.20	\$62.40	
MRF479	15	T0-220CE	\$33.00	\$78.00	
MRF485*	15	T0-220	\$18.60	\$47.40	
MRF492	90	211-11	\$37.80	\$84.00	\$172.80
MRF492A	90	145A 10	\$45.00	\$102.00	\$172.80
PT9847	IN	211-09	\$50.40	\$110.40	\$230.40
SD1405	75	211-11	\$38.40	\$91.20	\$194.40
SD1407*	IN	211-11	\$60.00	\$132.00	\$276.00
SD1452	80	145A-10	\$40.80	\$93.60	
2SC2290	80	211-11	\$35.40	\$94.80	\$199.20
2SC2879	120	211-11	\$47.76	\$110.40	\$203.40
2SC2509	15	T0-220CE	\$21.60	\$52.80	
2SC2097	85	316-01	\$67.20	\$144.00	

### SPECIAL HIGH OUTPUT 2-30MHz 12V types

SRF2072	65	211-07	\$33.00	\$73.20	\$199.20
SRF3662	120	211-11	\$63.60	\$139.20	\$309.60
SRF3775	75	211-07	\$35.40	\$78.00	\$160.80
SRF3795	90	211-11	\$38.40	\$88.80	\$172.80
SRF3800	110	211-11	\$42.00	\$93.60	\$196.80

## RF Power MOSFET Transistors

Type	P in watts	P out watts	Gain dB	Vdd Volts	Package Type	Price inc. tax
<b>1.5-150 MHz SSB FETs, data shown at 30 MHz</b>						
MRF138	0.6	30	17	28	211-07	\$84.55
MRF140	4.7	150	15	28	211-11	\$134.40
MRF148	0.5	30	18	50	211-07	\$81.60
MRF150	2.9	150	17	50	211-11	\$160.00
MRF153	6	300	17	50	368-01	\$790.00
MRF154	12	600	17	50	368-01	\$994.00
MRF156	6	600	20	50	368-01	\$1,070.00
<b>2-200 MHz VHF AM/FM FETs, data shown at 150 MHz</b>						
MRF134	0.4	5	11	28	211-07	\$38.40
MRF136	0.75	15	13	28	211-07	\$42.16
MRF136Y	1.9	30	12	28	319B-01	\$94.00
MRF137	1.9	30	12	28	211-07	\$57.60
MRF141G	13	300	14	28	375-01	\$336.00
MRF151G	5	300	17	50	375-01	\$312.00
MRF171	2.8	45	12	28	211-07	\$82.80
MRF172	8	80	10	28	211-11	\$117.50
MRF174	15.8	125	9	28	211-11	\$160.00
<b>2-400 MHz UHF AM/FM FETs, data shown at 400MHz</b>						
MRF161	0.4	5	11	28	244-04	\$39.00
MRF162	1.2	15	11	28	244-04	\$90.00
MRF163	2.5	25	10	28	244-04	\$55.00

All TRANSISTORS NPN, 12V unless noted  
(\* = 28V, \*\* = 50V)

## RF Power Hybrid modules

Part Number	Freq Range	P in mW	P o W	BIAS Class	Price inc tax
SAU4	430-450	200	10	AB	\$119.00
SAV6	154-162	200	28	C	\$102.00
SAV7	144-148	200	28	C	\$102.00
SAV12	144-148	150	5	C	\$56.40
SAV17	144-148	400	50	C	\$147.60
M57713	144-148	200	10	AB	\$67.40
M57715	144-148	200	10	C	\$101.40
M57716	420-450	200	10	AB	\$74.88
M57719N	142-163	200	10	C	\$103.08
M57726	144-146	200	40	C	\$143.88
M57727	144-148	200	25	AB	\$87.36
M57729	430-470	600	25	C	\$168.00
M57732L	135-160	20	5	C	\$66.00
M57735	50-54	200	10	AB	\$85.80
M57737	144-148	200	25	C	\$116.40
M57741L	148-160	200	25	C	\$136.80
M57741M	156-168	250	25	C	\$136.80
M57741H	164-275	300	25	C	\$144.00
M57745	430-450	300	25	AB	\$189.60
M57755	806-866	100	20	C	\$189.00
M57759	890-915	2	0.2	C	\$70.80
M57762	1240-1300	1000	20	AB	\$158.40
M57788M	430-450	400	45	C	\$227.64
M67705M	430-470	20	5	C	\$95.76
M67705H	470-512	20	5	C	\$95.76
M67715	1240-1300	10	1.5	AB	\$71.64
MHW590	10-400	1	0.9	A	\$127.36
MHW591	1-250	1	0.7	A	\$100.80
MHW592	1-250	1	0.7	A	\$115.20
MHW710-1	400-440	250	15	C	\$146.40
MHW710-2	440-470	250	15	C	\$146.40
MHW710-3	470-512	250	15	C	\$146.40
MHW808A3				MCH	\$175.20



# for the home brewer...

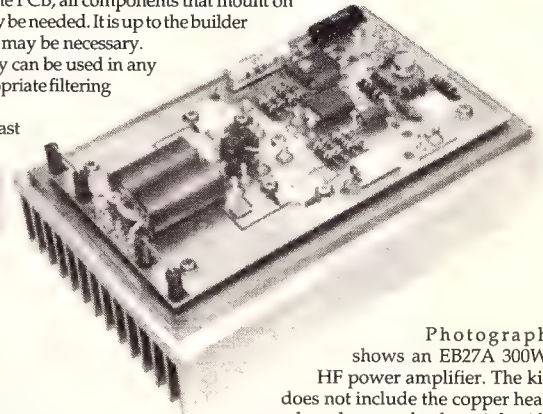
## Motorola app note POWER AMPLIFIERS - short form kits

These RF power amplifier kits offer a wide range of amplifiers in short form kits. All of these kits include the PCB, all components that mount on the PCB, the active devices and any necessary unusual wire such as high temperature enamel or Teflon which may be needed. It is up to the builder to provide heat spreading, heat sinking, forced air cooling, connectors, output filtering and any switching that may be necessary.

All of these amplifiers are linear units with any necessary bias stabilisation provided on the PCB, thus they can be used in any desired mode including CW, SSB or FM. When used well below their maximum ratings and combined with appropriate filtering they are eminently suited to testing applications.

Applications for these kits include amateur, commercial or instrumentation HF amplifiers, FM broadcast amplifiers and drivers and amateur or commercial VHF amplifier systems.

Application Note	Frequency Range	Power in	Power out	DC Supply	Devices used	Price inc tax
AN779L	1.6-30	+8 dbm	20W	12.5V @ 5A	2 x MRF475 2 x MRF476	\$201.00
AN779H	1.6-30	-10 dbm	20W	12.5V @ 5A	MHW591 2xMRF433	\$224.00
EB63	2-30	1-5 W	140W	13.6V @ 22A	2xMRF454	\$213.00
AN762	1.6-30	1-5W	140W	13.6V < 30A	2xMRF454	\$224.00
EB27A	2-30	18-20W	300W	28V @ 20A	2xMRF422	\$334.00
AN758	2-30	15-18W	300W	50V @ 14A	2xMRF429	\$391.00
EB104	2-30	6W	600W	40-50V @ 18-20A	2xMRF150	\$1,064.00
AR313	10-150	15W	300W	12-28V @ 22A typ	MRF141G	\$920.00
AR305	10-175	15W	300W	40-50V @ 12-15A	MRF151G	\$920.00



Photograph shows an EB27A 300W HF power amplifier. The kit does not include the copper heat spreader plate or the heatsink. All

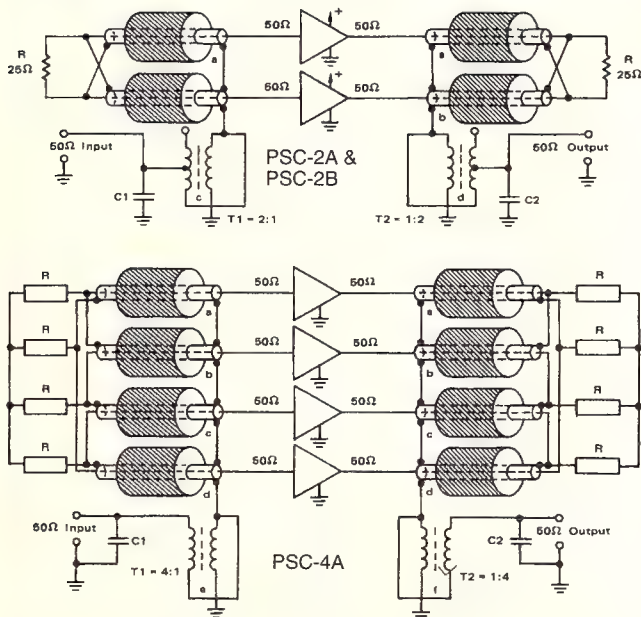
other components, including pre-wound and assembled transformers are included in all of the kits. Individual components and selections of parts are available for all models, please enquire for details. All of these kits are strictly in accordance with the original Motorola application notes with additional details and assembly notes included where necessary. Only top quality components and materials are used in assembling these kits!

## High Power splitter / combiners

In the mid-1970's Motorola released an application note, AN-749, by Helge Granberg with details of the design of hybrid power splitters and combiners for HF use. These three types are produced to Granbergs original designs and have been successfully used in many applications over the years.

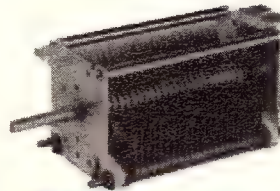
Careful construction using uncommon materials is necessary to ensure the best possible performance from combiners such as these, for this reason all types are supplied complete assembled and tested. Whilst provision is made for power ballasting resistors they are not fitted. See Motorola RF Devices data book, Vol 2, pp 7-98 — 7-106 for more details.

Type Number	Application Notes	Power Rating	Price inc tax
PSC-2A	Motorola AN749 AN758	600W PEP	\$168.00
PSC-2B		1000W PEP	\$192.00
PSC-4A		1200W PEP	\$216.00



## Transmitting Capacitors

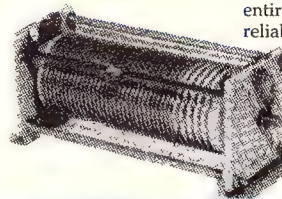
High quality capacitors for linear amplifiers are hard to find, but now you can use these top quality MFJ capacitors in your own projects at realistic prices!



Stock Number	Value pf	Depth	Power Rating	Used in	Price inc tax
CH48	300 pf	45 mm	300 W	MFJ-901	\$24.30
CH49	245 pf	267 mm	3 kW	MFJ-989	\$79.20
CH50	250 pf	280 mm	3kw	MFJ-986	\$96.00
CH51	250 pf	165 mm	1.5 kW	MFJ-962	\$58.80

## High Power roller inductors

These high performance roller inductors are the same as those used in the MFJ antenna tuners across the entire HF spectrum. They are extremely robust and reliable units for any home-brew application.



Stock Number	Power Rating	Used with	Used in	Price inc tax
CG297	3 kW	CH49	MFJ-989C	\$128.40
CG298	3 kW	CH50	MFJ-986	\$146.70

## Broadband ferrite transformers



Stock Number	Core Length	Price inc tax
TC43	6mm	\$7.20
TC44	13mm	\$7.80
TC45	19mm	\$9.00
TC46	25mm	\$9.00
TC47	32mm	\$10.20

## High Power splitter / combiners



Stock Number	Type	Core (mm)	Power PEP	Price inc tax
TC48	Input	6x13	70W	\$7.20
TC49	In/Output	13x13	300W	\$9.00
TC50	Output	6x29	1500W	\$10.80
TC51	Output	13x29	2500W	\$11.88



# Coax connectors and cable...

## BNC clamp style cable male



**PC34** \$3.60  
Standard clamp connector for RG58 style 50Ω cable

**PC35** \$3.60  
Standard clamp connector for RG59 style 75Ω cable

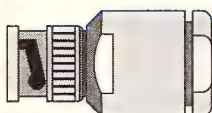
**PC36** \$6.78  
Square cut (easy assembly) cable plug for RG58 50Ω

**PC37** \$6.78  
Square cut (easy assembly) cable plug for RG59 75Ω

**PC38** \$26.11  
Standard clamp plug for RG178 submini 50Ω cable

**PC158** \$8.28  
Standard clamp plug for RG174 submini 50Ω cable

## BNC clamp type for large cables



**PC171** \$6.35  
Clamp cable male for RG213 and similar 50Ω cable

## BNC Crimp type cable male



**PC39** \$5.94  
Crimp plug for RG174/179 submini 50Ω cable

**PC40** \$3.18  
Crimp plug for RG58 style 50Ω cable

**PC42** \$2.76  
Crimp plug for RG59 & RG62 cable with captive contact

**PC156** \$3.90  
Crimp plug for RG174 submini 50Ω cable

## BNC bulkhead mount male



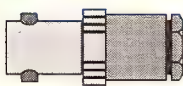
**PC129** \$9.36  
Single hole mount male

## BNC flange mount male



**PC136** \$6.60  
Small flange male

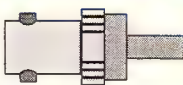
## BNC clamp type cable female



**PC28** \$4.45  
Standard clamp cable female for RG58 style 50Ω cable

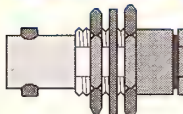
**PC29** \$5.98  
Standard clamp cable female for RG59 75Ω style cable

## BNC crimp type cable female



**PC999** \$  
Free cable female for RG58 style 50Ω cable

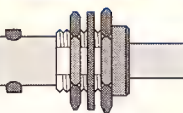
## BNC bulkhead clamp female



**PC30** \$5.78  
Clamp type bulkhead female for RG58 style 50Ω cable

**PC31** \$5.35  
Clamp type bulkhead female for RG59 style 75Ω cable

## BNC bulkhead crimp female



**PC33** \$5.62  
Crimp type bulkhead female for RG59 & RG62 type cables

**PC170** \$5.66  
Crimp type bulkhead female for RG58 style 50Ω cables

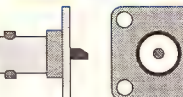
## BNC bulkhead mount female



**PC24** \$2.28  
Bulkhead mount female for thin panels

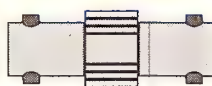
**PC25** \$5.46  
Bulkhead mount female for thick panels

## BNC flange mount female

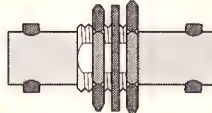


**PC32** \$3.80  
Standard flange mount female

## BNC in-series adaptors



**PC44** \$3.02  
Female-female adaptor

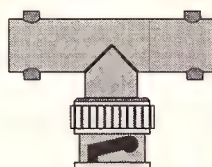


**PC106** \$5.62  
Female-female bulkhead mount adaptor

**PC107** \$6.54  
Female-female bulkhead mount adaptor, insulated

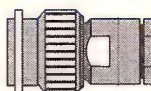


**PC43** \$9.07  
Male-male adaptor



**PC45** \$8.76  
BNC F-M-F tee adaptor

## TNC cable male connectors

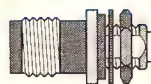


**PC151** \$2.81  
Standard clamp male for RG58 style 50Ω cable

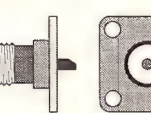


**PC161** \$3.66  
Crimp type cable male for RG58 style 50Ω cable

## TNC female connectors

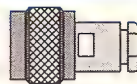


**PC175** \$3.32  
Bulkhead female



**PC176** \$5.65  
Flange female

## Type N clamp type cable male



**PC54** \$8.81  
Clamp type cable male for RG58 style 50Ω cable



**PC53** \$12.00  
Clamp type cable male for RG213 style 50Ω cable



**PC166** \$26.96  
Clamp type cable male for 10D-FB and 9913 50Ω cable

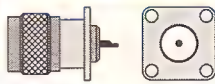
## Type N crimp type cable male



**PC137** \$5.16  
Crimp type cable male for RG58 style 50Ω cable

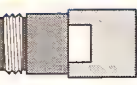
**PC152** \$14.22  
Crimp type cable male for RG213 style 50Ω cable

## Type N flange mount male



**PC138** \$20.83  
Standard flange mount male

## Type N cable female



**PC169** \$10.20  
Clamp type cable female for RG213 style 50Ω cable

## Type N bulkhead female



**PC56** \$6.48  
Standard single hole female

**PC52** \$26.92  
Single hole mount for .44in hole, same size as BNC connector

## Type N flange female



**PC57** \$6.54  
Standard flange mount female

## UHF connectors



**PC17A** \$3.12  
Teflon insulated cable plug for RG-213 size cable



**PC18** \$0.42  
reducer sleeve for RG58



**PC19** \$0.42  
reducer sleeve for RG59.



**PC15** \$7.04  
Single hole mounting socket.



**PC16** \$3.54  
Four hole flange mounting socket.



**PC22** \$4.26  
Female - female adaptor or joiner.



**PC20** \$10.37  
Female - male - female TEE adaptor.



**PC23** \$2.27  
Male - male adaptor or joiner.

## CO-AXIAL CABLE

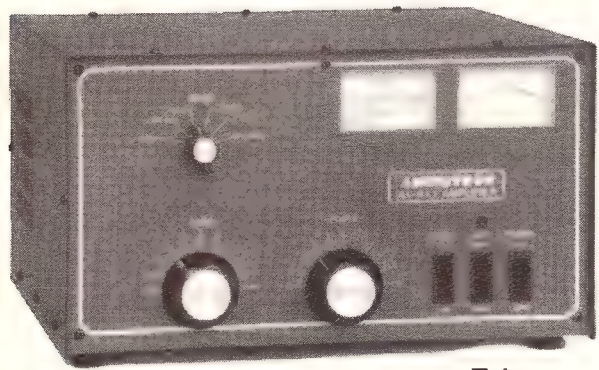
A comprehensive range of co-axial cable for all your RF needs, three types of subminiature for internal and instrumentation use, standard sizes in three impedances for communications, television and computer use, semi-rigid types for microwave use and low loss cable for long runs at VHF and UHF in communications installations. Note that the low loss types, 9913 style and 10DFB cables both use special connectors, enquire for details. Connectors for semi-rigid cable are stocked in SMA and type N.

Stock Number	RG type	Zo Ω	Loss db/100m @ 400MHz	Price per mtr
<b>Subminiature PVC insulated</b>				
WB36	RG174	50	65.6	\$1.32
<b>Subminiature TEFLON® insulated</b>				
WB37	RG178	50	95.1	\$2.69
WB35	RG179	75	68.9	\$4.56
<b>Semi-Rigid TEFLON® insulated</b>				
WB57	RG405 .085"	50	34	\$14.93
WB56	RG402 .141"	50	21	\$14.93
<b>Standard style PVC insulated</b>				
WB38	RG58	50	33.1	\$1.02
WB54	RG213	50	15.4	\$2.76
WB70	9913	50	8.9	\$4.99
WB71	10DFB	50	6.8	\$7.92
WB39	RG59	75	23	\$1.44
WB41	RG62	93	17.4	\$1.14



# AMERITRON

**AL811**  
**600W PEP**  
**HF Linear amplifier**



## AL-811 Specifications:

### Input:

Circuit type:	Pi-network, slug tuned coils
Maximum VSWR at resonance:	1.3:1
Minimum 2:1 VSWR bandwidth:	15%
Maximum drive power permissible:	100 watts
Typical drive for rated output:	75 watts

### Output:

Circuit type:	Pi-network
1/2 hour carrier:	400 watts
30 second carrier:	550 watts
1/2 hour PEP two tone:	>600 watts
30 seconds PEP two tone:	>600 watts
Efficiency:	typically >70%

### Power Supply:

Circuit type:	full wave bridge
No load voltage:	1700 V
Full load voltage:	1500 V
Full load current:	550 mA
Regulation:	10%
Maximum draw at rated output:	4A
AC Input:	240V 50Hz

### Tubes:

Type:	(3) 811A
Continuous dissipation:	65 watts per tube
Warm-up time:	10 seconds

### Metering:

Multimeter:	reads HV and plate current
Grid meter:	reads PA grid current
ALC:	Negative going, 0-20 V adjustable, phono jack

### Efficiency

CW:	>70%
SSB (envelope crest):	>70%

### Connectors:

Relay: keys amplifier when grounded. +12 VDC open circuit and supplies 100 mA when grounded. A built-in back-pulse cancelling diode protects the exciter.

RF input: SO-239 50 ohm input

RF out: 50 ohms with full power into any SWR below 3:1

### Physical:

Dimensions:	406D x 350W x 203H
Weight:	13.7kg

### Frequency Coverage

160, 80, 40, 30, 20, 17, 15, 12 and 10 metres

Third Order IMD at Rated Output: -33dB

Shades of the magnificent past! Remember the days when a power amplifier looked like it meant business and was heavy enough to convey the message? Well those days are back! Ameritron, one of the USA's leading amateur power amplifier manufacturers has released an amplifier using three 811A tubes in Class AB2 grounded grid to deliver a clean, comfortable 600W PEP. The AL-811 amplifier needs only 40W of drive for the VK legal limit. Best of all the cost of running the AL-811 is low, and a new set of tubes will only cost \$105 — not \$350 to \$700 or more for other amplifiers using more exotic tubes.

Ameritron's choice of the 811A is no accident, nor is it a purely economical one. The 811A has developed an enviable reputation for robustness and reliability over many years of operation in amateur and commercial service. Its directly heated thoriated tungsten filament is immune to cathode stripping which can ruin an expensive indirectly heated tube in a few milliseconds if the amplifier is mistuned.

Ameritron has chosen a simple yet extremely effective input circuit, a single Pi section with a slug-tuned coil for each position of the band switch. The slugs of the coils can be easily adjusted without removing the cover so that you can peak the amplifier without danger of being exposed to high voltage supplies.

- 600W PEP output
- All bands : 160, 80, 40, 30, 20, 17, 15, 12 & 10 metres
- Three 811A tubes
- Quiet fan cooling
- Rugged construction
- 50Hz rated transformer
- Easy to use
- Vernier anode tuning
- Large twin meters
- Safety interlock

**\$1449<sup>00</sup>**

Plus freight - \$30 within Australia.

Every linear amplifier sold by Stewart Electronics receives a complete pre-delivery inspection and test in our own workshops. Results of the test are included with each amplifier. Our experienced staff are always available to assist you with operating and set-up questions you may have. All part of our service with a smile!

## Ameritron Linears

### AL-1500X \$5850

A 1.5kW rated linear using an EIMAC 3CX1500 (8877) tube. The ultimate in rugged HF linears for any use!

### AL-1500XQ \$6522

For CW, RTTY & AMTOR a PIN diode QSK switch can be fitted at the factory.

### AL-1200X \$4675

Rated for 1.5kW output using an EIMAC 3CX1200A7 tube, rugged yet economical HF power.

### AL-1200XQ \$5340

For CW, RTTY & AMTOR a PIN diode QSK switch can be fitted at the factory.

### AL-82X \$4450

For the 'glass radio' operator, 1.5kW output using a pair of 3-500Z tubes, probably our most popular big amp.

### AL-82XQ \$5120

For CW, RTTY & AMTOR a PIN diode QSK switch can be fitted at the factory.

### AL-80BX \$2665

The ever popular 3-500Z in a classic 1.5kW amplifier, the cheapest way to join the big guns on HF!

### AL-80BXQ \$3330

For CW, RTTY & AMTOR a PIN diode QSK switch can be fitted at the factory.

### AL-811HX \$1775

Using four 811A tubes the AL-811HX generates 800W output in the same size package as the AL-811X.

# VCI

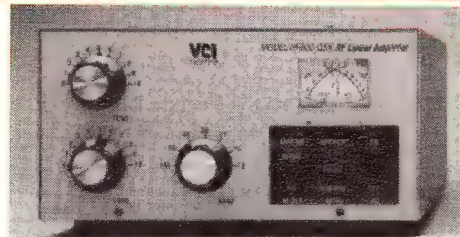
## NEW! Vectronics HF linear amplifiers from Canada



The Vector-500 Linear amplifier from Vectronics is a class AB2 amplifier using four 811A high performance triode tubes. It is able to operate at 1000W PEP input and is designed to provide stable, reliable operation. The crossed needle tuning system makes for easy operation and the fully protected power supply makes for peace of mind!

Frequencies	Amateur bands 160-10M
Drive Power	60-80W typ for full output
Output Power	800W PEP typical
Tubes	4 of 811A
Plate voltage	1600V
Input impedance	50Ω tuned matching cct
Output impedance	50Ω, VSWR < 2:1
Harmonic suppression	-40dBc min
Intermod distortion	-32dBc min
Duty cycle	100% SSB other modes 50%
Cooling	15cfm forced air

VCT500 1kW input linear amp **\$1980**



The HF-600 amplifier from Vectronics uses a single 3-500Z (8802) tube to develop output powers of 800-1000W on all HF amateurs bands from 1.8-30MHz. Like the Vector-500 the HF-600 is fitted with Vectronics patented crossed needle metering system. An optional QSK vacuum relay system can be fitted for CW or AMTOR operation.

Frequencies	Amateur bands 160-10M
Drive Power	50-60W typ for full output
Output Power	1000W PEP typical
Tube	Amperex 8802 (3-500Z)
Plate voltage	3200-3400V
Input impedance	50Ω π-network on all bands
Output impedance	50Ω, π-L on all bands
Harmonic suppression	-45dBc min
Intermod distortion	-40dBc min
Duty cycle	100% SSB other modes 50%
Cooling	15cfm forced air

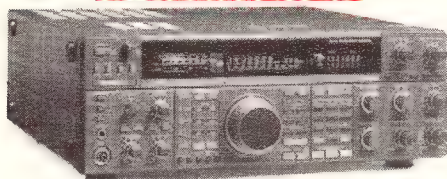
HF600 1kW PEP output linear amp **\$3080**

HF600QSK vacuum relays fitted **\$3695**



# KENWOOD

## HF TRANSCEIVERS



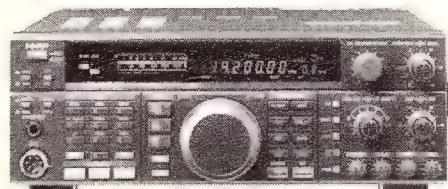
TS-950S 150W Tx/Rx, 100mems, ATU, PS	\$5000
TS-950SD TS-950S with DSP	\$6500
DSP-10 DSP add-on (for TS-950S)	\$765
SO-2 High stab reference osc.	\$300
VS-2 Voice synthesizer	\$79
YG-455C-1 500Hz 455kHz CW filter	\$180
YG-455CN-1 250Hz 455kHz CW filter	\$210
YG-455S-1 SSB Filter	\$210
YK-88C-1 500Hz 8.83MHz CW filter	\$80
SP-950 Matching speaker	\$190

**CALL FOR SPECIALS!**



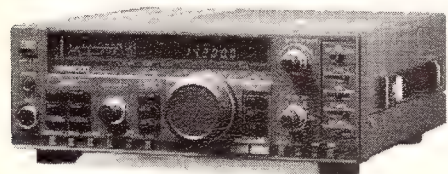
TS-850SAT 100W TX/RX, ATU, 100mems	\$3199
DSP-100 DSP add-on	\$980
DRU-2 Digital recording unit	\$239
SO-2 High stab reference osc.	\$300
VS-2 Voice synthesizer	\$79
IF-232C Interface controller	\$150
455kHz Wide & Narrow CW filters	
8.83MHz Wide & Narrow CW & SSB filters	

**CALL FOR SPECIALS!**



TS-450SAT 100W Tx/Rx, ATU, 100mems	\$2499
TS-450S same as TS-450SAT but no ATU	\$2204
TS-690S 100W HF/50W 6mtr no ATU	\$2499
TS-690SAT adds ATU to TS-690S	\$2794
AT-450 auto ATU for TS-690S/TS-450S	\$295
DSP-100 DSP add-on	\$980
MB-430 Mobile bracket	\$24
SO-2 High stab reference osc.	\$300
TU-8 Tone (CTCSS) encoder	\$40
VS-2 Voice synthesizer	\$79
IF-232C Interface controller	\$150
455kHz Wide & Narrow CW filters	
8.83MHz Wide & Narrow CW & SSB filters	

**CALL FOR SPECIALS!**



TS-140S 100W HF mobile	\$1490
YG-455C-1 500Hz 455kHz CW filter	\$180
YK-455C-1 500Hz 455kHz CW filter	\$100
MB-430 Mobile bracket	\$24

## VHF/UHF Base Station

TS-790A 2mtr/70cm+23cm optional	\$2943
UT-10 23cm 10W module	\$907
IF-232C Interface controller	\$150
VS-2 Voice synthesizer	\$79
TSU-5 Tone (CTCSS) encoder	\$65

## VHF/UHF Mobile



TM-241A 2mtr 50W 20mems	\$640
RC-20 Remote control head	\$425
RC-10 Remote handset	\$425
DRU-1 Digital recording unit	\$239
DTU-2 DTMF unit	\$37
TSU-6 Tone (CTCSS) unit	\$62

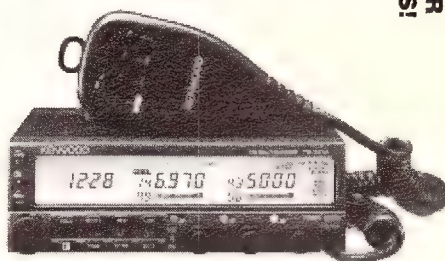
**CALL FOR SPECIALS!**

**CALL FOR SPECIALS!**



**CALL FOR SPECIALS!**

TM-732A 2m/70cm 50/35W Dual	\$1227
PG-4K Detachable front panel kit	\$75
TSU-7 Tone (CTCSS) unit	\$70



TM-741A 2m/70cm+optional band mobile	\$1338
UT-1200 23cm FM unit	\$420
UT-50S 6mtr FM unit	\$420
UT-28S 10mtr FM unit	\$420
PG-4K Detachable front panel kit	\$75
DTU-2 DTMF enc/dec for DTSS	\$37.20
TSU-7 Tone decoder (CTCSS)	\$70

**CALL FOR SPECIALS!**

**Stewart Electronics is an authorised Kenwood Australia dealer!**

**TOP TRADES**  
We'll gladly trade-in your clean amateur gear towards new KENWOOD equipment

## RECEIVER



R-5000 .1-30MHz 100mems	\$1595
VC-20 VHF conv 108-174MHz	\$105
YK-88A-1 6kHz AM filter	\$80
YK-88SN 1.8kHz SSB filter	\$80
YK-88C 500Hz CW filter	\$80
YK-88CN 270Hz CW filter	\$80
SP-430 Matching speaker	\$79
MB-430 Mobile bracket	\$24
VS-1 Voice synthesizer	\$79

**CALL FOR SPECIALS!**

## Hand-held transceivers

TH78A 2m/70cm Dual band handheld

**\$897**

- ★ Dual frequency receive
- ★ Alphanumeric memory
- ★ 50 multi-function memories
- ★ Optional 250 memory ch's!
- ★ Double band scan
- ★ Dual Tone Squelch (DTSS)
- ★ DTMF paging
- ★ Alphanumeric paging
- ★ 20mW/10mW economy power setting.
- ★ Dual squelch controls
- ★ Auto band repeater memory
- ★ TOT timer built in
- ★ Sliding keypad cover
- ★ Advanced ergonomic design.

**COMING SOON**  
The TH-78A will soon be joined by the new TH-28A two metre single band transceiver!



## ACCESSORIES

HS-6 Small headphones	\$31
HS-7 Micro headphones	\$31
LF-30A Low pass filter	\$65
MA-5 5 band helical whip	\$260
MA-700 VHF/UHF whip assy	\$160
MC-44 Hand microphone	\$61
MC-44DM DTMF hand mic	\$85
MC-46 6 pin DTMF mic	\$84
MC-48B Scanning DTMF 8 pin	\$84
MC55/2 Mobile mic	\$88
MC60A Desk microphone	\$175
MC80 Desk microphone	\$100
MC85 Multi-function mic	\$205
PG-3G 25A line filter for TM-732/741A	\$64
PG-4K Remote front panel kit TM732/741A	\$75
PG-4L Remote front panel kit 7mtrs	\$130
PS-32 13.8V 20A Power supply	\$446
PS-52 13.8V 25A HD power supply	\$546

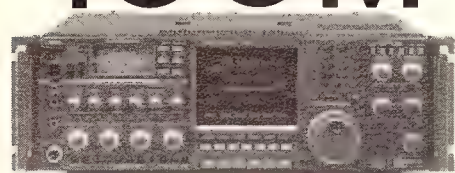
Errors and omissions excepted, all prices, information and specifications subject to change without notice. All information is believed to be correct at time of printing.



# ICOM

As an authorised ICOM dealer every ICOM product we sell carries an Australian Warranty, meets Australian regulatory requirements and is fully supported, not only by us but by ICOM Australia's own expertise. Don't be caught out buying from 'grey market' sources!

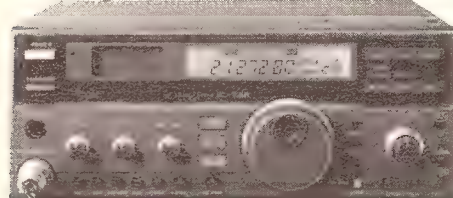
## VHF/UHF base stations



IC-781 150W Tx/Rx,ATU,PS,Scope \$9771



IC-765 100W Tx/Rx,ATU,PS,Keyer \$4999  
IC-735 100W Tx/Rx,mobile,12mems \$1880  
PS-55 Matching power supply \$522  
AT-150 Automatic ATU \$806  
FL-32A 500Hz CW Filter \$139  
EX-243 Electronic Kever \$121



IC-728 100W Tx/Rx,mobile,PBT \$1687  
IC-726 100W HF & 10W 6 mtrs (FM inc) \$1978  
AT-160 Matching auto ATU \$806.20  
AH-3 Mobile auto ATU \$667  
UT-30 Tone encoder \$31  
UI-7 AM/FM option (for 728) \$92  
FL100 500Hz CW filter \$139.20  
FL101 250Hz CW/RTTY filter \$116  
MB23 Carrying handle \$14.50

### Base station accessories

IC-2KL 500W out amp with PS \$3190  
AT-500 Auto ATU \$1299

### IC-4KL

1kW out solid state B/I Auto tuner & PS, full remote control \$10,730



EX-627 Auto antenna selector \$487  
AH-2 8 Band auto ATU & whip system \$1234  
PS15 13.8V 20A power supply \$440  
PS30 13.8V 25A Switch mode PS \$800  
PS55 13.8V 20A matches 725/6/8/9 \$522  
SM6 Basic desk microphone \$98  
SM8 Desk microphone, dual output \$179  
SM20 Desk mic up/down, audio low cut \$191  
SP3 Desk speaker \$127  
SP20 Speaker matches 765/781/R9000 \$214

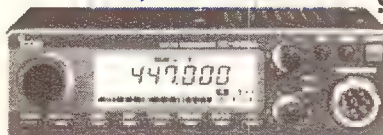


IC-275H 2 metres 100W 99mems \$1920  
IC-475H 70cm 75W 99mems \$2240  
IC-575H 10 & 6 m 25/100W 99mems \$2671

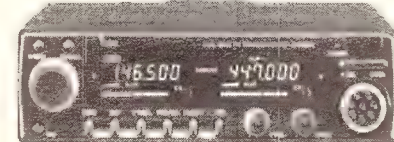


IC-970A 2m & 70cm 25W super-base! \$4068  
IC-970H 2m & 70cm 45W super base! \$4452  
UX-97A 1.2GHz band unit \$1566  
UX-98A 2.4GHz band unit \$1914  
UX-R96 50-905MHz receive unit \$533

## VHF/UHF mobile



IC-229A 2m 25W compact with scan \$715  
IC-229H 2m 45W compact with scan \$774  
IC-449A 70cm 35W compact w scan \$809  
IC-3220H 2m/70cm 45/35W full duplex \$1158



IC-2410H 2m/70cm latest dual watch \$1391  
IC-901A 2m/70cm Dual band RC \$1600  
UX-R91A Broad band receiver module \$533  
UX-19A 10W 10m FM unit \$493  
UX-59A 10W 6m FM unit \$493  
UX-S92A 2m SSB/CW unit \$748  
UX-129A 1.2GHz band unit \$870

## RECEIVERS

R-1 Hand held 0.1-1300Mhz \$725  
R-100 0.1-1856MHz mobile \$986

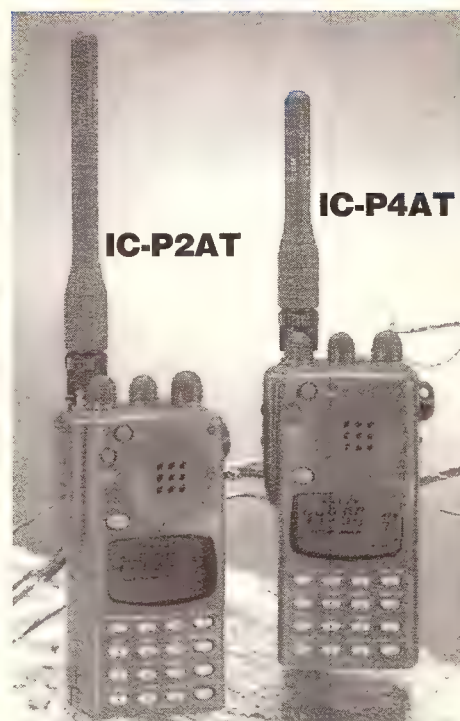


R-72A 100kHz-30MHz 100mems \$1368



R-7100 25MHz-2GHz 900mems \$2122  
R-9000 100kHz-2GHz 1000mems \$7714

## HAND-HELD



IC-P2AT \$564  
IC-2iA Ultra mini 100 mems NEW!  
IC-P4AT AI 70cm 100 mems \$646  
IC-4iA Ultra mini 100 mems NEW!  
IC-2SRA 2m & 25-950 MHz rcv w keypad \$832  
IC-4SRA 70cm & 25-950MHz rcv w keypad \$873  
IC-W2A 2m/70cm full feat twin \$873

## HAND-HELD ACCESSORIES

BP2 7.2V 450mAH battery pack \$116  
BP3 8.4V 270mAH battery pack \$75.40  
BP4 Battery case for 6 x AA batteries \$23.20  
BP5 10.8V 450mAH fast charge battery \$133.40  
BP5A 10.8V 450mAH battery pack \$133.40  
BP7 13.2V 450mAH battery pack \$156.60  
BP8 8.4V 800mAH battery pack \$133.40  
CM96 8.2V 1.2AH battery pack \$156.60  
BP20 Battery case 6 x AA cells (μ series) \$23.20  
BP21 7.2V 120mAH battery (μ series) \$81.20  
BP22 8.4V 270mAH battery (μ series) \$87.00  
BP23 8.4V 600mAH battery (μ series) \$98.60  
BP24 10.8V 600mAH battery (μ series) \$127.60  
BP81 7.2V 110mAH battery (S series) \$81.20  
BP82 7.2V 300mAH battery (S series) \$84.68  
BP83 7.2V 600mAH battery (S series) \$93.96  
BP84 7.2V 1AH battery (S series) \$133.40  
BP85 12V 340mAH battery (S series) \$139.20  
BP90 Battery case 6 x AA cells (S series) \$29.00  
BP110 Battery case 6 x AA cells (P series) \$29.00  
BP111 7.2V 400mAH battery (P series) \$87.00  
BP112 7.2V 700mAH battery (P series) \$102.08  
BP113 7.2V 1.2AH battery (P series) \$139.20  
BP114 12V 400mAH battery (P series) \$168.20  
BC36 Drop-in charger \$174.00  
BC72 Drop in charger S series etc. \$174.00  
AQ2 Waterproof bag (larger H/H's) \$42.92  
BA12 rapid charge adaptor fir int batts \$29.00  
AD12 Ext power adaptor G series \$29.00  
CP11 Cig lighter cable assy older H/H's \$34.80  
CP12 Cig lighter cable assy S series & R1 \$34.80  
CP13 Cig lighter cable assy W & SRA \$34.80

**TOP TRADES**  
We'll gladly trade-in your clean amateur gear towards new ICOM equipment



ISØAGY	10 NOV 91	Sardinia	VK4JH
JA1AHS	22 JAN 56	Japan	VK4NG (SK)
JD1ADP	05 MAY 79	Ogasawara Island	VK8GB
JD1YAA	31 MAR 84	Minami Torishima	VK8GB
JT1CO	28 SEP 91	Mongolia	VK6HK
KC6IN	23 MAR 80	Ponape E.C.I.	VK8GB (V63)
KC6SZ	14 OCT 79	Yap W.C.I.	VK4JH
KG4SM	15 MAR 89	Guantanamo Bay	VK4PU
KG6DI	04 MAR 78	Guam Island	VK8GB (KH2)
KG6RO	24 SEP 78	Saipan	VK8GB (KHØ)
KH1/VK9NL	03 APR 88	Howland Island	VK4TL
KH3AB	28 MAR 81	Johnstone Island	VK8GB
KH4AE	28 FEB 91	Midway Island	VK4BRG
KH5/W6HTH	17 APR 81	Palmyra/Jarvis Island	VK5RO
KH6/W7ACS	26 AUG 47	Hawaii	VK5KL
KH7/KH6JEB	23 MAR 90	Kure Island	VK9LE (VK3OT)
KL7/WA4TNV	13 MAR 79	Alaska	VK2KAY
KP2A	26 MAR 89	American Virgin Islands	VK3OT
KP4AAN	13 APR 81	Puerto Rico	VK2DDG
KR6AK	11 MAR 59	Ryuku Islands	VK9XK (VK4XA)
KX6AF	20 MAR 58	Marshall Islands	VK4NG (V73)
KZ5NW	?? MAR 81	Canal Zone	VK4RO
LA3EQ	25 FEB 89	Norway	VK6HK
LU8OB	28 APR 59	Argentina	VK4NG
LX1SI	31 OCT 90	Luxembourg	VK6PA
OA8ABT	12 OCT 90	Peru	VK4BRG
OE5PAM	01 MAR 91	Austria	VK6JQ
OH1YP	25 FEB 89	Finland	VK6HK
OK1DIG	08 FEB 91	Czechoslovakia	VK6PA
ON7YD	28 OCT 90	Belgium	VK6JQ
OZ1LO	20 OCT 90	Denmark	VK4JH
P29MJ	28 NOV 75	Papua New Guinea	VK3ZAZ (VK3OT)
P43AS	26 MAR 89	Aruba	VK4ZJB
PAØRDY	12 OCT 89	Netherlands	VK8ZLX
PJ9JT	02 MAR 89	Curacao	VK4PU
PYØFF	26 MAR 92	Fernando/Norona	VK6PA
PY5CC	20 APR 91	Brazil	VK7IK
PZ1AP	30 MAR 89	Suriname	VK4BRG
S21ZE	11 OCT 92	Bangladesh	VK8RH
SM6PU	13 OCT 89	Sweden	VK8ZLX
SV1DH	17 OCT 89	Greece	VK8RH
T2ØAR	15 DEC 87	Tuvalu	VK4PU
T3ØDJ	28 MAR 89	Kiribati West	VK4PU
T32AB	15 MAR 82	Kiribati East	VK2DDG (VK4DDG)
T33JS	19 MAY 89	Banaba Island	VK4BRG
T7ØA	21 OCT 91	San Marino	VK6JQ
TG9AWS	28 MAR 89	Guatemala	VK2BA
Ti2JIC	26 MAR 82	Costa Rica	VK2DDG
TL8MB	04 APR 91	Central Africa	VK6JQ
V51E	26 APR 91	Namibia	VK6RO
VE7AQQ	08 APR 59	Canada	VK2ADE (VK4QM)
VKØWVW	10 DEC 72	Macquarie Island	VK2NN
VK2BKE	15 JAN 75	Lord Howe Island	VK3AKK
VK9BW	25 APR 58	Territory of New Guinea	VK9XK
VK9XK	29 NOV 51	Territory of Papua	VK4BJ
VK9XT	10 MAR 80	Christmas Island	VK8GB
VK9ZM	22 NOV 78	Willis Island	VK2BNN (SK)
VK9ZNG	27 NOV 75	Norfolk Island	VK2ZRU
VK9ZYX	22 NOV 81	Cocos Keeling Island	VK8GB
VP1MT	13 APR 79	British Honduras	VK5RO
VP2MO	01 APR 89	Monsserrat	VK2BA
VP2VGR	17 MAR 81	British Virgin Islands	VK3OT
VP5D	25 MAR 89	Turks & Caicos	VK2QF
VR2BC	18 DEC 49	Fiji Islands	VK2AH
VS2DQ	19 APR 58	Malaya	VK6ZAV
VS5DX	26 NOV 80	Brunei	VK8GB
VS6AB	05 MAR 80	Hong Kong	VK8GB
W6PUZ	14 MAR 58	United States	VK4HD
XE1FU	01 MAY 59	Mexico	VK3ALZ
XF4L	14 APR 89	Revilla Gigedo	VK2QF
YB9X	03 JAN 80	Indonesia	VK6OX
YJ8KM	01 NOV 76	New Hebrides	VK4ZSH
YO7VY	21 OCT 91	Romania	VK8RH
YS1ECB	06 APR 84	El Salvador	VK2DDG
YU3EA	03 MAR 91	Yugoslavia	VK6JQ
YV5/DL3ZM	19 MAR 81	Venezuela	VK2DDG
ZA1ZJ	27 OCT 91	Albania	VK6PA
ZBØT	22 OCT 91	Gibraltar	VK8RH
ZC4MK	31 OCT 90	Sovereign/Bases Cyprus	VK6RO
ZD7BW	21 MAR 81	St Helena Island	VK4TL
ZD8TC	20 MAR 82	Ascension Island	VK4RO
ZF2DN	28 MAR 81	Cayman Island	VK2BA
ZK1CG	01 APR 89	South Cook Island	VK5BC
ZK1WL	28 MAR 89	North Cook Island	VK2QF
ZK2RS	29 DEC 82	Niue Island	VK2BA
ZK3KY	13 OCT 90	Tokelau	VK4BRG
ZL2DS	29 DEC 48	New Zealand	VK4HD
ZL4OY/C	19 JUN 83	Chatham Island	VK2BA
ZL9TPY	21 JAN 90	Auckland Island	VK4BRG
ZM8OY	10 DEC 85	Kermadec Island	VK4PU
ZP6XDW	28 APR 91	Paraguay	VK4BRG
ZS6XL	29 APR 90	South Africa	VK6RO

**Notes** ZL9TJD The Snare does not count for ZL9 Auckland Island. Thanks to *Amateur Radio*, VK2QF, VK3AKK, VK3AMK, VK5LP, VK6BE, VK6JQ, VK6HK, VK6PA, VK6RO, VK8AH, VK8RH, VK9YJ (VK3AWY), VK4XA, VK4PU, VK4HD, VK4JH, VK4DDG. All care has been taken in the compilation of this listing but no responsibility will be accepted for any errors or omissions.



# Scalar — an Oz success story

## We visit the plant

By Neil Duncan, VK3OK  
Heathmont, Victoria



### A visit

**I**t seems that Australians like hearing about the success of a typical 'quiet achiever'. On that basis, the Scalar story will no doubt capture a little of your imagination. This is a company producing antennas of the highest possible quality with the minimum of fuss — and with a *one hundred per cent Australian* content.

I can recall visiting the Scalar factory out at Kilsyth in Victoria on several occasions, way back in the seventies. The idea was to buy up enough goodies to get yet another antenna up in the air. A fibreglass whip ready-made as a five-eighths wave base-loaded two metre antenna was one of my purchases, as I remember. Since that time, Scalar has changed a lot and, like so many others, hard times have been a problem.

Well, the wheel has finally turned, and Scalar is every bit as friendly, efficient and cost-effective as it was in the good old days — and more. Scalar has been through the mill in the years since its start-up as **Scalar Pty Ltd** in 1973. It has survived one episode of going broke, one revamping as a subsidiary of **Vicom** and the recession of the early nineties, and is currently on its feet again as an independently-run company sporting offices in Victoria, the ACT, NSW, Queensland, WA and New Zealand.

Scalar makes and sells antennas and related products to cover a frequency range from 2 to 1500 MHz, for cellular, HF, VHF, UHF, base, mobile, marine and airborne applications. Of late, its major markets have been commercial and military markets, Telecom, the cellular telephone service and a widely diverse range of overseas customers. We guess that means, in simple economic terms, that we radio amateurs represent a small market amongst such a list — yet amazingly, as a part of the 'wheel turning' we mentioned before, our needs are now being as fully addressed as ever.

The Editor and I dropped in to have a look at Scalar's Melbourne showroom/factory early on a glorious, clear Thursday morning and were given a most warm welcome. First impressions are lasting ones, they say. The office, factory floor and display areas were shown to us quite freely and just about every possible question we asked was answered on the spot (some of those military orders are a little 'private' though). The most obvious observations to make were i) how incredibly *spotless* the whole place was and (ii) the 'lean', efficient use of staff in each area.

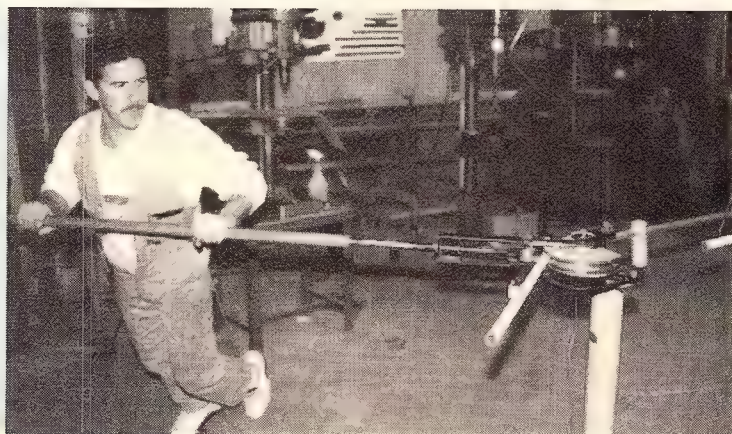
Manager **Andrew Bridger** ran through a list of some of the more recent products with us and he discussed the various merits of some of his more spectacular wares. It seems that quality control is one of the prime concerns of Scalar. A process called **TQM** (Total Quality Control) operates in full swing there. It is, in part, responsible for Scalar being declared as one of the only two fully-accredited Telecom Australia antenna suppliers. It was also responsible for what looked like a staff walk-out during our visit. No, that was no walk out — the staff was enthusiastically heading to the next TQM meeting.

The accompanying photographs tell quite a lot without needing more explanation. Clearly, the range and diversity of antennas coming out of the Scalar factory is quite remarkable. Being intrigued by nifty processes, a couple of corners of the establishment really caught my eye.

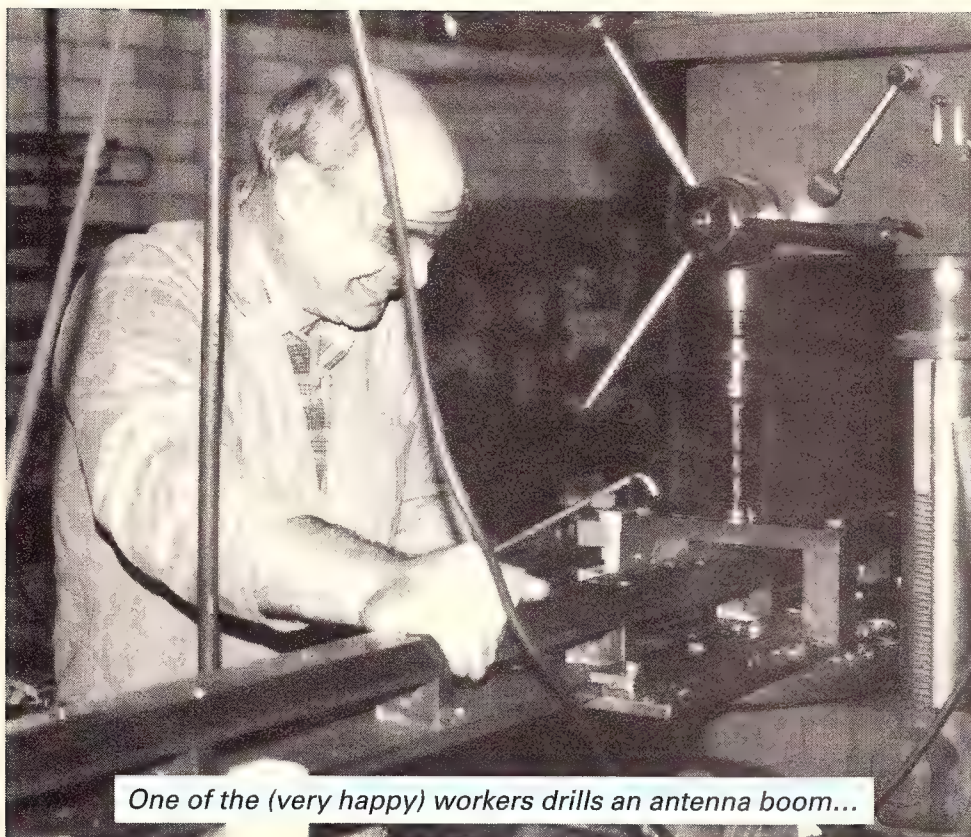
Have you ever tried actually *folding* a large folded dipole — one made with tubing several centimetres in diameter? Well, we were shown that very procedure in the throes of the bending operation itself. The result was a perfect fold, with not a mark on the anodised surface of the tubing and an absolutely precise job.



*You set it up (left)... then push like heck (right)! The tube bends are beautiful and perfect, with no kinks or bends.*







*One of the (very happy) workers drills an antenna boom...*

Scalar produces a great deal of smaller hardware 'in-house', too. A whole section of the floor is devoted to lathes, drill presses and associated mechanical devices which produce brass things with threads, holes, thingoes and doodads all over them. Why rely on external suppliers when you can make 85 per cent of your own needs both better and faster?

On the other hand, it is clearly inefficient to produce some items yourself. Where material such as coaxial cable has to be purchased elsewhere, Australian-made products are always chosen. There *has* to be something in that.

The large, fenced-off inventory area was opened up for us to snoop through. The range of items was staggering. Just about anything you could ever need for a mobile antenna installation from glass-mount antennas (particularly for cellular phone operation!) to spring mounts to UHF fittings was there. Mirror mounts, 'trunk mount' and magnetic bases were all there in abundance.

In addition, for the base station enthusiasts, Scalar's range extends to mast brackets, right angle brackets, baluns, insulators, harnesses, discone hubs, clamps, all manner of connectors, those threaded brass things, reels and *reels* and *reels* of coax, whip blanks and so on. Thankfully, the Scalar catalogue lists all of them. That's right, any of those zillion items can be purchased if you wish.

### From design to ordering

We were given some catalogues to peruse and, from them, one thing becomes very obvious — Scalar has many different categories of antenna products. To cope with this, many of its products are listed in broad categories with a high level of adaptability. That is, many products can be configured for multiple applications. A beam, for example, may be cut for different center frequencies or whips cut to match specific requirements, and so on.

Our obvious interest centred on items for the amateur market. As part of the strategy for coping with tough economic times, products for our particular applications are made according to a very clever strategy. Consider those shiny, all-stainless steel whips we saw at the Gosford convention. About 120 were sold up there, we understand, and that is an amazing number. (It is not surprising — that particular two metre five-eighths antenna works *very* well).

We've both run these whips on our mobile set-ups and can attest to their stunning performance. Now, Scalar produces these whips in one large batch, probably once a year. If you want one, they probably have some in stock. If they aren't, then you will have to wait until the next run. Sometimes batches of some amateur radio products are done with a forthcoming convention or field day in mind. To my mind, this smacks of a company not only tuned into economics, but one keeping an eye firmly on our hobby.

Most commercial users would probably order a product according to a specific need and want it NOW. These would either be taken from stock with

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1-24 hour turn-around time or an adaptation, (according to that policy of adaptable products we mentioned). Perhaps even, the product would be designed in the computer laboratory by Scalar's engineers and then field-tested at its test site up Healesville way. Items produced in the factory in this way take a little longer, needless to say.

The time taken from ordering (the lass in the front office with the order book and beaming smile just about runs the company, we were told!) through to final products is typically a day or two for standard orders. It can be almost on the spot (sometimes for an extra charge...) and may be longer if much design input is needed. To our minds, it all sounded quite reasonable and very efficient.

Amateur operators are encouraged to ring the Scalar factory direct with inquiries and yes, one-off orders are most welcomed. Clubs or groups are also encouraged to inquire about bulk-buy deals too.

### Quality and costs

It seems to us that Scalar has some impressive customers. As an example of this, an amazing number of antennas (HF monopoles) were custom-designed and supplied for the ships going to the Gulf War back when that little lot was on. Now, one chooses one's antenna suppliers carefully in such a situation and timing is an important factor, too. Adding that up gives another perspective of the Scalar operation.

The quality of Scalar's more standard product lines is interesting to investigate too. Take, for example, Scalar's UHF, 3- to 15-element beams. You can buy them in anodised, welded or powder-coated format. Naturally the pricing changes accordingly. Scalar's anodising process results in a 40 micron surface penetration, a coating which should last for at least 15 years. Apparently, some other manufacturers use an *aludining* process. This reaches a typical depth of 2 microns and should last 3 or so months. Look for the gold, green or red shiny surfaces on the aludined ones...

Once again, Andrew Bridger would not name names. He does not see Scalar in such a form of contest with other companies. He sees Scalar as a company standing on the merits of its products in an absolute sense. Further examples are the use of military-spec coax on all products where coax is part of the assembly, the use of stainless steel to inhibit rust in a vast number of applications and the over-size tubing and other hardware where strength and durability is a key element.

On the other hand, Andrew did seem a little worried about the corresponding price of his products for the amateur radio corner of the market. Quality does not come

cheaply was his implication. Now see here, Andrew, that may not be a fair self-assessment! \$126 for a 15-element beam for the 70 cm band is an example I will take. Good grief that's competitive — a lower price than we had expected given his comment. The quality of the antenna speaks for itself — it is indeed a commercial grade product supplied to we amateurs.

That situation extends over all of the products which people in our hobby may be interested in. What about those whips and  $\frac{5}{8}\lambda$  antennas which we used to use on two metres? Yep, they are still there and such features as UV resistance is built into their shrink-tubing. Compare that

with some of those CB whips you see around the place — especially after a year's use on a car!

### Some interesting products

It is clear that some of Scalar's products are an 'overkill' with respect to our hobby in the sense that they are designed for extremely rigorous physical conditions (atop TV transmitting towers, or for harsh marine environments, for example). Many though are very highly suitable indeed.

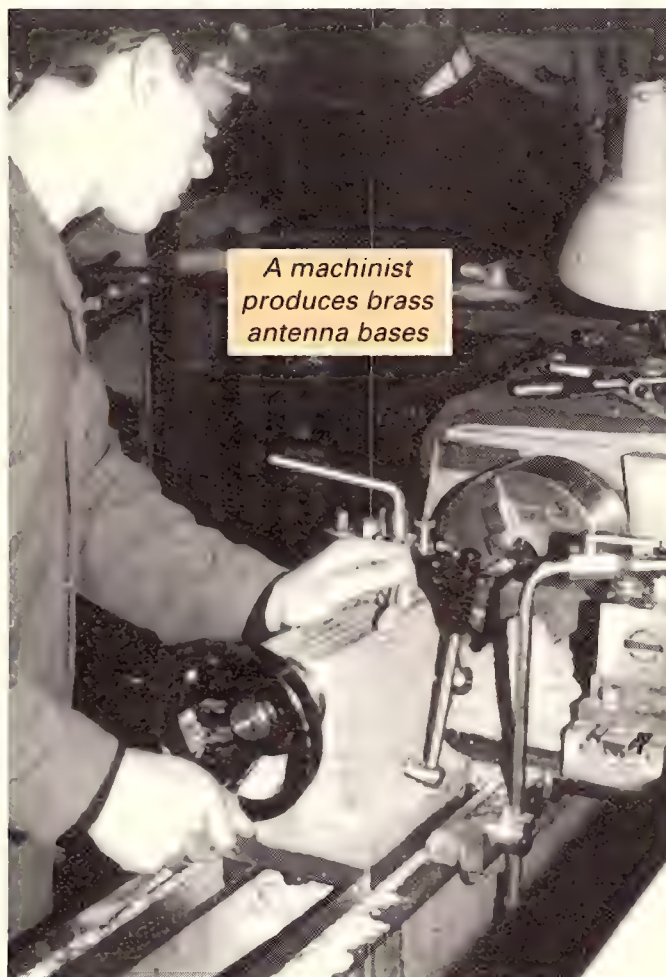
As examples of the first kind, in the current catalogue, I see ground-planes, broadband discones, coaxial dipoles, side-mount dipoles and arrays, base station monopoles, phased arrays, multi-frequency dipole kits, FM broadcast arrays, HF log-periodic arrays (wire ones), rugged HF dipoles and surveillance antennas.

Broadband Yagis — 60 MHz bandwidth with your selection of center frequency within the range 400-520 MHz — 'lowband' and 'highband' mobile verticals and their associated bases, mounts and hardware,

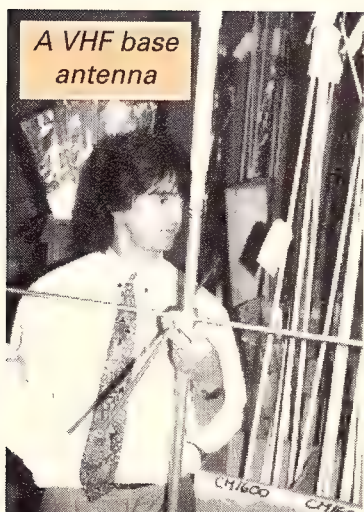
'on-glass' mobile antennas, stubby antennas for hand-held transceiver antenna replacement use, HF mobile whips, strong bases and springs (non-rust of course), on-mirror and on-bumper mounts and a whole range of interesting antenna mounting hardware are examples of the second type.

Favorites of mine (especially with respect to price) are the HB D/L mobile whip mounting base, the 5/8 stainless steel whip for 144 MHz, the heavy duty gutter mount, tilt-over bracket and the new 'OZ' series of through-glass antennas which go very well indeed on the amateur bands.

Now, the **OZV-1** and **OZU-1** are very recent products indeed and are worthy of close scrutiny if you are **1)** wanting a VHF or UHF mobile antenna (that's what the V and U stand for) or **2)** have a pristine new car with no gutters and you don't want to hack holes in it anywhere. The through-glass concept does lose about 1 dB or so but that







**A VHF base antenna**

is a small price to pay — and it is not Scalar's fault! As long as you don't want to run more than 100 watts or so and as long as rare DX is not your thing, these antennas should be a real winner.

No, these were not developed for our particular market. As I have said, it would be financial folly for a company of this size to concentrate on so small a market. In this instance I am led to believe that an order form the CFA resulted in an antenna which was easily adaptable to our needs — so why not?

(Keep watching these pages for a full review of the new 70 cm and two metre all-Australian through-glass antennas. Neil's new car was the ideal place to put them, and we'll tell you all about it very soon. Ed.)

Who am I to tell you what the best of Scalar's range is? Perhaps the ground-independent dipoles, the mobile HF whips or the discone may be more your style. In our tour of the factory, we saw only a selection of the range in the actual throes of being made. There was plenty of stock in the store room and the sales representatives were all out, hard at work. That spells a pretty active company!

One little place which caught our eye was the reject bin. There was a heap of aluminium — off-cuts from the manufacturing process. Square section, round tubing and solid rod, radome fibreglass rods, beams on which someone had scratched the anodising (who amongst us would worry?!) and a lot of other things too. Yes, Scalar would welcome purchase from members of the public.

### Summary

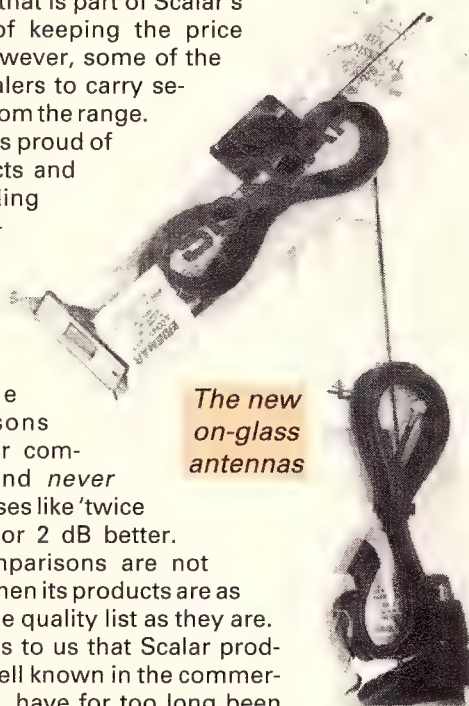
No, Scalar is not a bargain basement antenna supplier. On the other hand, despite the almost legendary quality of its products, the actual price list more often than not reveals

far less expensive antennas and associated products than the corresponding overseas ones.

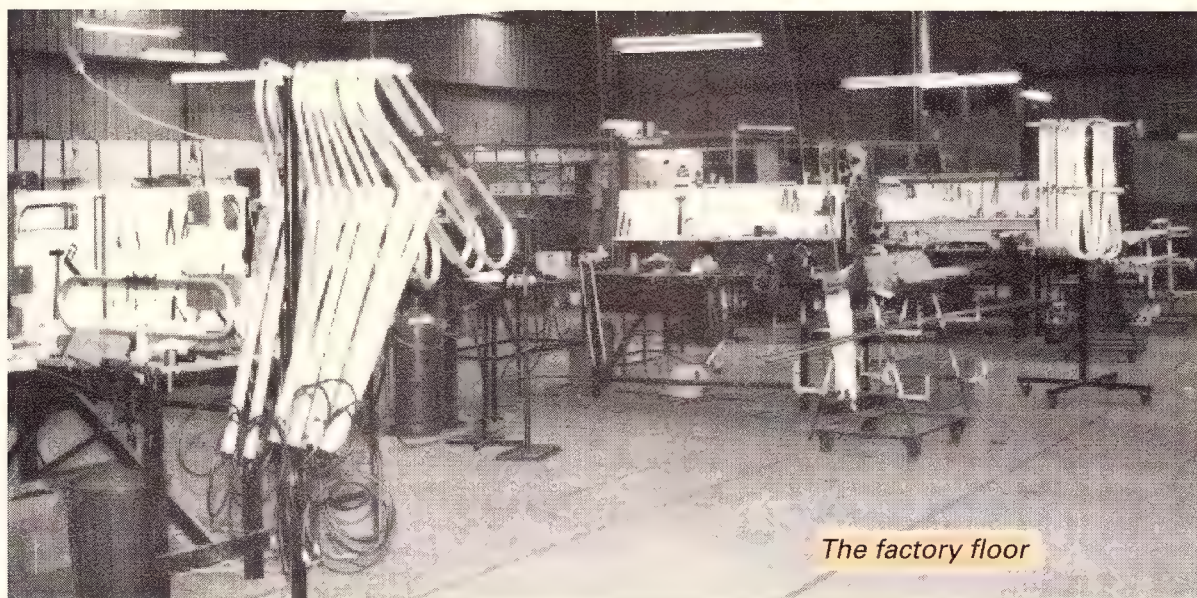
So where do you buy their products then? Well, there are Scalar outlets in the states we mentioned earlier on and that's who you would ring. There is a \$50 minimum order but that is no problem if you think about it. No, it not easy to buy Scalar products from shops around the place but that is part of Scalar's method of keeping the price down. However, some of the major dealers to carry selections from the range.

Scalar is proud of its products and the standing of its products in the industry. Scalar does not welcome comparisons with other companies, and *never* uses phrases like 'twice as good' or 2 dB better. Such comparisons are not needed when its products are as high on the quality list as they are.

It seems to us that Scalar products, so well known in the commercial world, have for too long been kept quietly away from the amateur market. Our visit to the revitalised Kilsyth plant gave us a bit of start — made us sit up and take notice, that's for sure!



**The new on-glass antennas**



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Band (MHz)	14/21/28	14/21/28	14/21/28	14/21/28	14/21/28	10/18/25	14/21/28	10/18/25	14/21/28	10/18/25	14/21/28	10/18/25	14/21/28
Element	4	3	2	2	1	1	3	2	3	1	1	1	5
Gain (dBi)	9.1	8	4/6/6	6/6/6	2.2	2.2	8	6	8	2.2	2.2	2.2	8.5,8.5,9.5
F/B Ratio	25/20/20	21/15/16	20/14/12	13/10/10	0	0	25/20/20	12/10/10	25/20/20	0	0	0	25
V S.W.R.	ACROSS THE BAND 1 6 OR BETTER												< 1.5
Max Power	2KWpep	2KWpep	1KWpep	2KWpep	2KWpep	2KWpep	2KWpep		2KWpep		2KWpep		3KW
Impedance	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	~50ohm		~50ohm		~50ohm		50
Element L	7.5m	7.3m	5m	7.3m	7.2m	8.5m	10.47m		10.47m		10.47m		10.6m
Boom L	6m	4.28m	2m	2m	—	—	6.28m		4.28m		—		4m
turning Ratio	6m	4.5m	2.74m	4m	3.6m	3.6m	6.0m		5.1m		5.23m		6.3
Shipping Weight	~15kg	~12.5kg	~9kg	~9kg	~3.5kg	4kg	~20kg		~17.5kg		~7kg		22kg
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TE-56

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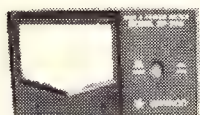
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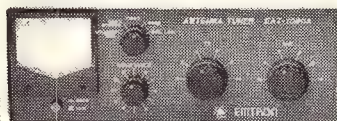
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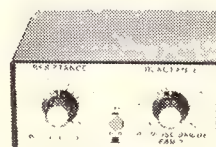


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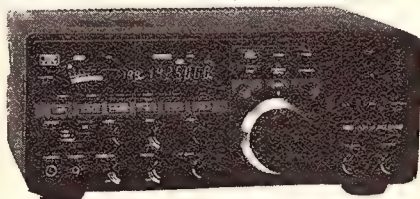
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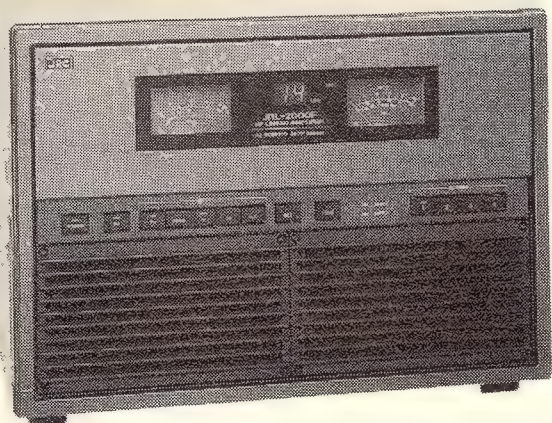
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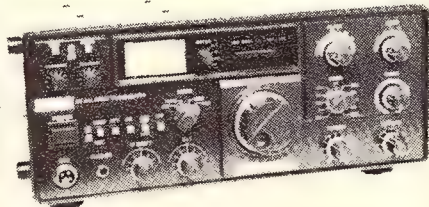
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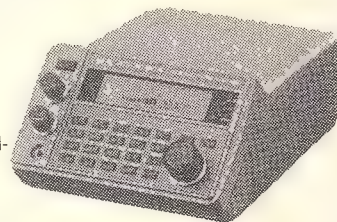
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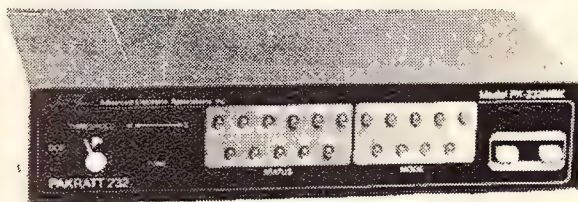
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**All times are expressed in Co-ordinated Universal Time (UTC or 'z'). Add 10 hours for Eastern Standard Time, 9½ hours for Central Standard Time, eight hours for Western Standard Time and 12 hours for New Zealand Standard Time. Add one hour in states where Daylight Savings Time applies.**

## 45 years of Radio Beijing

Forty five years ago, on September 11, 1947, the **New China Broadcasting Station**, North Shaanxi — predecessor of **Radio Beijing** — began broadcasting in English. The station was located in Shahe Village at the foot of the Taihang Mountains in Hubei province. On March 25, 1949 it moved to Beijing and shortly afterwards commenced transmissions in Japanese. About a year later, the station changed its name to **Radio Peking** (revised to **Radio Beijing** many years later).

At present, **Radio Beijing** is on the air for 146 hours every day, broadcasting in 43 languages and dialects. Apart from news services, each language department has its own regular features, tailored to its target audience.

In addition, **RB** has set up 17 overseas bureaus and relationships have been established with quite a few international broadcasting organisations to improve on long distance reception and to facilitate exchanges of personnel.

Less than obvious has been the gradual change of **Radio Beijing's** programming style over the years, and when one reminisces over old tapes of the station, it is clear that the warmer, less clinical style of today's announcers is more inviting.

One impressive 'before and after' comparison shows that, in 1976, before the start of reforms, **RB** received fewer than 20,000 letters from overseas listeners. In 1991 that figure had

risen to 230,000 letters from 155 countries and regions around the world. The latest edition of **RB's** listener magazine, *The Messenger*, includes a photo of station staffers taken in 1950, most resplendent in Chairman Mao-style caps and button-up shirts. Musings of past and present announcers make interesting reading, and between the lines one gets a slight hint of the political changes in China over the years.

On the subject of change, it has now been confirmed that **Radio Beijing** will change its name to **China Radio International (CRI)** on January 1, 1993. The new name has actually been in use since October 1 this year, along with the present familiar 'This is **Radio Beijing**' signature.

According to director *Cui Yuling*, the purpose of the change is to make the station's foreign language name identical with its Chinese moniker, and also to distinguish the service from a local station of the same name.

## New transmission period under way

Much of the column this issue is concerned with the frequency changes made by international stations on September 27, corresponding to the start of the 'W 92' transmission period. The 'W' actually stands for 'winter', another example of the bias towards northern hemisphere stations in the administration of world frequency usage. Most of the major international broadcasters do, however, reside in the northern hemisphere, and will be planning their spectrum usage around winter conditions.

Aside from the two-transmission period 'W' and 'Z' system ('Z' stands for summer!), there are plenty of die-hard broadcasters that adopt the old four-period plan ('D', 'M', 'J' and 'S'), with frequency changes made on the first Sundays in November, March, May and September. To confuse things still further, some other countries adopt both systems, and stations in the Commonwealth of Independent States (the former USSR), for example, make frequency changes six times each year.

So how does one keep track of all this, it is fair to ask? The short answer is... don't bother! Best to rely on publications such as **Amateur Radio Action** to keep abreast of where you're likely to find your favorite stations...

*(That's a good idea, Craig — the circulation department might even approve a pay rise! Well, you never know... Ed.)*

## Sweden

**Radio Sweden** in Stockholm has this schedule for English language services until March 27, 1993:

### To Europe, Africa and the Middle East:

1600-1630z on 15,270 kHz;  
2130-2230z on 6065, 9655 and 1179 kHz; and  
2330-0000z on 6065 and 1179 kHz.

### To Asia/Australasia:

1330-1400z on 21,625 and 15,240 kHz;  
2130-2230z on 11,955 kHz; and  
0100-0130z on 11,820 and 9695 kHz.

### To North America:

1600-1630z on 21,500 and 17,870 kHz;  
0200-0230z on 11,705 and 9695 kHz.

Note the conservative frequency usage, and in particular the fact that the Swedish authorities have not yet ventured into the 22 metre (13 MHz) band, which suffers less congestion than the established frequency spans.

Services for Australasia must be seen as inadequate in that the timing really only suits listeners in Western Australia. The evening service at 1330z corresponds to 12:30 am Eastern Summer Time, and is of even less benefit to those in New Zealand. Similarly, the morning service at 2130z goes out at a time when most listeners in the more populous states are well and truly on their way to work.

## Austria schedule

**Radio Austria International's** schedule has changed little for 'W 92', and one sees most of the traditional **ORF** frequencies trundled out again for the current period. English is aired to this plan:

### To Europe:

0530-0600z, 0830-0900z, 1030-1100z and 1230-1300z on 6155 and 13,730 kHz; and  
1530-1600z on 6155, 13,730 and 21,490 kHz; 1930-2000z on 6155 and 5945 kHz.

### To Middle East:

0530-0600z on 15,410 and 21,490 kHz; and 1930-2000z on 9880 kHz



## Africa:

1530-1600z on 21,490 kHz; and  
1930-2000z on 13,730 kHz

## Asia:

1230-1300z and 1330-1400z on 17,730  
and 15,450 kHz; and  
1530-1600z & 1630-1700z on 11,780 kHz

## Australasia:

0830-0900z and 1030-1100z on 15,450  
and 21,490 kHz

## North America:

0130-0200z and 0330-0400z on 9875  
and 13,730 kHz;  
0530-0600z and 0630-0700z on 6015  
kHz; and  
1230-1300z on 13,730 kHz

## Latin America:

2330-0000z on 9870 and 13,730 kHz; and  
0130-0200z and 0330-0400z on 9870 kHz.

*Austrian Shortwave Panorama*, a  
look at developments in communica-  
tions and DX news, is on Sundays at  
1230, 1330, 1630 and 2330z, and Mon-  
days 0330z.

## Russia for hire

It's a case of have transmitters, will  
rent! Two more international broad-  
casters have recently hopped on the  
bandwagon, recently negotiating  
agreements to use spare transmitter  
capacity in Russia.

Firstly, the Dutch international  
shortwave service, **Radio Nederland**,  
has announced that it has been given  
permission to negotiate with Russian  
authorities about the possibility of re-  
lay transmissions. The Hilversum-  
based station has long sought to im-  
prove its signal into the Asian region,  
and for some time plans were on the  
table for the construction of a joint  
relay base (with the **BBC**) in Thailand.

Funding problems became the stum-  
bling block and Radio Nederland has  
taken the no doubt cheaper, but just as  
effective, option of using transmitting  
facilities in Siberia. Background re-  
search has apparently been completed  
and a delegation has received positive  
feedback from the Russian authorities,  
eager for western hard currency.

The BBC has different reasons for  
seeking Russian help; programs in  
Mandarin Chinese transmitted from the  
BBC's Singapore and Hong Kong relay

bases are presently being jammed by  
the Chinese authorities and, under-  
standably, the BBC is looking for a  
different approach angle to reach its  
large Chinese audience. Two senders  
in the Russian far east are to be hired,  
in addition to a transmitter in Tashkent  
(Uzbekistan) for coverage of the Indian  
Sub-Continent.

The exact frequencies will be ad-  
vised when known.

Whilst on the subject, some feed-  
back from a station which has for some  
months now been using Russian relay  
transmitters, many of these used in the  
past for jamming of western broad-  
casts. **Radio Deutsche Welle**, Ger-  
many's international voice, has been  
broadcasting 20 hours per day via Rus-  
sia, and on the whole is satisfied with  
results.

There are said to be some minor  
problems with the modulation feed,  
and it is easy to pick the different sound  
quality of the relayed signal.

*This news courtesy of 'Media Net-  
work'.*

*Bob Padula* has been kind enough to  
pass on this listing of Deutsche Welle's  
Russian relays for the 'W 92' period,  
including specific sites:

7315 kHz Zhigulevsk 1400-1800z to Asia  
7340 kHz Novosibirsk 1000-1400z to  
the Far East  
9875 kHz Novosibirsk 1430-1700z to  
South Asia  
11,795 kHz Novosibirsk 2200-0000z to  
East Asia  
12,055 kHz Zhigulevsk 0200-0250z to  
South Asia  
12,055 kHz Zhigulevsk 0300-0350z to  
the Middle East  
12,045 kHz Novosibirsk 2230-2320z to  
South Asia  
15,350 kHz Novosibirsk 1200-1320z to  
the Far East  
15,350 kHz Irkutsk 1100-1150z to the Far  
East  
15,550 kHz Novosibirsk 0100-0150z to  
South Asia  
17,625 kHz Zhigulevsk 0800-0850z to  
the Middle East  
17,735 kHz Zhigulevsk 1000-1050z to  
the Middle East

## South Africa

*Don Phillips* of the UK provides this  
schedule for domestic services on  
shortwave from the SABC:

**Radio Suid Afrika** to the Northwest  
Cape and Namibia (in Afrikaans): 0500-  
0700z on 3980 kHz, 0640-0855z on 7285  
kHz, 0840-1840z on 11,770 kHz and 1830-  
0100z on 3980 kHz.

**Radio Orion** (English/Afrikaans): 0100-  
0500z on 3980 kHz

**Radio Oranje** (English/Afrikaans):  
0500-0710z on 3215 kHz, 0715-1815z on  
9630 kHz and 1820-0000z on 3215 kHz.

*This information courtesy of  
'Shortwave News'.*

Staying in South Africa, although I  
haven't yet checked it myself, **Radio  
RSA** is widely reported to have under-  
gone a name change and is apparently  
now known as '**Africa Channel**'.

English broadcasts from Africa Chan-  
nel are listed:

0200-0400z on 9730 kHz to East and  
central Africa;  
0300-0500z on 3995 kHz for southern  
Africa;  
0400-0600z on 15,220 kHz to Nigeria  
and West Africa;  
0600-0700z on 15,220 kHz for far west  
Africa;

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Duoband 10-15m .....	\$249.00
Delta Loop 10-11m .....	\$172.00
5/8 Vertical 10-11m .....	\$109.00
3el 15m .....	\$171.00
3el 20m .....	\$279.00
6el 6m .....	\$181.00
5el 2m .....	\$70.00
12el 2m .....	\$112.00
2m Dingo .....	\$86.00
Multiband verticals, no traps .....	\$245.00

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1000-1100z on 11,900 kHz for east Africa;  
 1100-1200z on 11,900 kHz for central Africa, Namibia and Botswana;  
 1600-1800z on 9565 kHz to east, central and southern Africa, and 11,885 kHz for west Africa;

Transmitters are 500 and 250 kW, feeding log periodic and curtain antennas.

## Netherlands Antilles

*Bruce MacGibbon* in Oregon, USA provides this schedule for **TransWorld Radio**, Bonaire:

9515 kHz 0655-0940z to northern Brazil in Portuguese;  
 9535 kHz 0300-0400z to North America and the Caribbean in English;  
 9535 kHz 0405-0500z to Central America in Spanish;  
 11,815 kHz 1055-1300z to eastern North America and the Caribbean in English;  
 11,865 kHz 0955-1045z to northern South America in Spanish;  
 11,885 kHz 0655-0940z to southern Brazil in Portuguese;  
 11,885 kHz 0955-1030z to southern South America in German;  
 11,930 kHz 0055-0230z to southern North America and the Caribbean in Spanish;  
 11,930 kHz 0255-0400z to North America and the Caribbean in English;  
 15,345 kHz 1055-1300z to eastern North America and the Caribbean in English;  
 15,355 kHz 2325-0000z to southern South America in German;  
 15,355 kHz 0000-0050z to southern South America in Spanish;  
 15,375 kHz 2155-0000z to northern Brazil in Portuguese;  
 15,375 kHz 0000-0050z to northern South America in Spanish;  
 15,375 kHz 0055-0230z to Central America in Spanish; and  
 15,445 kHz 2155-2315z to southern Brazil in Portuguese.

This schedule will be effective until May 2, 1993.

## Dominican Republic

It's not often that we have the opportunity to herald the arrival of a new shortwave station from this Caribbean nation, however a broadcaster identifying as '**Radio Cima**' has appeared on 4962 kHz and is providing quite reasonable reception in eastern Australia. I've been hearing this one at

around 0900z with continuous Latin pop music and infrequent announcements. The 1992 '**World Radio and TV Handbook**' lists such a station for 100.5 MHz FM, and it is presumed that the shortwave transmitter operates in parallel. Programming is in Spanish.

## New frequency for peace station

Costa Rica's **Radio For Peace International** is now being observed on the relatively new frequency of 7385 kHz USB and provides strong signals at around 0800z. Also announced on air at this time are 15,030, 13,630 and 7375 kHz.

## New Zealand

**Radio New Zealand International** is another station operating to an amended schedule, this one introduced on October 4:

**1650-1849z** Sunday to Friday on 9675 kHz;

**1850-2138z** Sunday to Friday on 15,120 kHz;

**2139-0658z** daily on 17,770 kHz;

**0659-1207z** daily on 9700 kHz; and

**1208-1649z** (occasional use only) on 9510 kHz.

## Norway

**Radio Norway International** has announced that English programming may be discontinued at the end of 1992 due to budgetary constraints. The Norwegian government has advised the station that funding is to dry up, and the station is now canvassing listener support for the weekends-only service.

## Radio Nederland schedule

**Radio Nederland** has made significant changes to its English schedule, particularly the Asian, European and North American services. The current plan reads thus:

**0030-0325z** to Asia on 11,655 and 9860 kHz

**0730-1025z** to Pacific on 11,895 kHz

**0730-0825z** to the Pacific on 9630 kHz

**0930-1025z** to the Pacific on 9720 kHz

**1130-1325z** to Europe on 5955 kHz

**1330-1425z** to Asia on 17,610 and 13,770 kHz

**1430-1625z** to Asia on 17,610, 15,150, 13,770 and 9895 kHz

**1730-1925z** to Africa on 21,590, 21,515, 9605 and 6020 kHz

**1930-2025z** to Africa on 21,590 and 17,605 kHz

**2330-0025z** to North America on 6165 and 6020 kHz

**0030-0125z** to North America on 11,835 kHz USB, 6165 and 6020 kHz

**0330-0425z** to North America on 11,720 and 9590 kHz

## Reception briefs...

Once again, our regular roundup of interesting loggings:

• **Office de Radio-Télévision du Senegal** in Dakar has made a rare appearance on 41 metres, and for some weeks now has been observed on 7168 kHz from sign-on at 0700z. The station opens with an interval signal, drums, anthem and identification announcements in French. This would appear to be a replacement for 4890 kHz, normally used at this time. The latest WRTVH doesn't list the 41 metre band channel, however it is believed to have been in use previously as a daytime channel only.

• *Nikolai Rudnev* reports hearing **Radio Alef**, one of the many private stations on shortwave from Russia, this one operated by a Jewish group. The frequency is 4055 kHz and Russia programming was observed from 1600-1630z on Tuesday, Thursdays and Sundays.

• Another log from *Nikolai Rudnev* is that of **Radio Payk-i Ajan** from Dushanbe in Tajikistan. Nikolai heard this one (previously unknown to me) signing on at 1500z on 7245 kHz. This is apparently a commercial operation, though the frequency choice is a bad one, with **Radio Kiev** also here at various times with its domestic service.

• *Tetsuya Kondo* of the *Asian Broadcasting Institute* advises that the anti-Vietnamese clandestine **Radio Irina** is now using 11,765 and 15,580 kHz for its daily program in Vietnamese from 1400-1500z, via transmitters in Russia. A phone call to the station's headquarters in Russia has revealed that the station's name 'Irina' comes from the name of the woman running the operation, who happened to answer the phone when Kondo called!

• *Mick Ogrizek* of Ballan, Victoria tells me that **Swiss Radio International** is using an unusual new frequency at the edge of the 13 metre





band. At 1300z the English broadcast for South East Asia was heard on 21,820 kHz, replacing 21,770 kHz. Advance information from SRI's latest schedule indicates that this frequency is used for a number of services for the current transmission period.

- **Radio Nacional** in Buenos Aires, Argentina, is back on 6060 kHz after a break of some weeks due to transmitter problems. The absence of this strong signal during our winter months provided the opportunity to hear the co-channel Brazilian, **Radio Universo** on occasion. Unfortunately, however, this channel is also used by **Radio Australia's** Shepparton site during our early evening. The best time to try for the Argentinian is 0900z.

- The Colombian broadcasting giant, **Caracol**, continues to be irregular on 5075 kHz, though does pack a strong punch when on the air. 0800z is a good time to check, when parallel 6150 kHz is also audible.

- More SSB tests from **Radio Havana**, this time for the Spanish service to Europe, noted on 13,660 kHz USB at 2130z. In further developments from Cuba, a report in *The Journal* indicates that Radio Havana has acquired a further transmitter for test transmissions, a former East German 20 kW PTP unit, to be used in the range 7300-7600 kHz. Tests are expected shortly and special QSL cards are to be offered.

- The trend towards lower sunspots is enhancing long-haul medium wave reception, and now considered a regular catch in our evenings is the US station **KCWW** in Tempe, Arizona.

This station boasts a country and western format and comes in strongly at 1100z nightly on 1580 kHz.

- The 120 metre band hasn't featured much lately, though it is a hunting ground for quite a few Indone-

sian local stations. One of the stronger signals on the band is **Radio Republik Indonesia** Ujung Pandang, which is heard on 2490 kHz until 2100z sign-off. Shortly after, the station reopens on its alternative channel, 4720 kHz.

- **Radio Baghdad** continues to use some odd channels, and *Anker Peterson* of Denmark reports hearing this one on 6558.8 kHz with the domestic service in Kurdish from 1600-1805z. Identification announcements were given at 1600, and Big Ben-style chimes noted at 1700z.

- *Bernard Grondin* reports that **Radio and TV Malagasy** in Antananarivo is using the new frequency of 9515 kHz, replacing long-standing 9690 kHz. The station was observed from 0741-0752z on this channel, along with parallel frequencies of 6135 and 7155 kHz. We can only hope that the new frequency appears at other times, when reception in Australia might be possible. This logging from *Shortwave News*.

## Mongolia

For those brave enough to sample the dour programming from **Radio Ulan Bator**, here is the latest available schedule for English:

**0910-0940z** on 12,015 and 11,850 kHz to Oceania

**1200-1230z** on 12,015 and 11,850 kHz for the Far East

**1445-1515z** on 13,780 and 7260 kHz to South Asia

**1940-2010z** on 11,850 and 11,790 kHz to Europe

Note that the 1200z transmission is aired only on Mondays, Thursdays and Saturdays. (*Good*. That means we don't have to hear too much of it...)

## Sri Lanka update

*Alok Das Gupta* of India reports that **Trans World Radio** Puttalam has received approval to broadcast via a 12.5 kW shortwave transmitter between 1330-1500z. Programming, which should already have commenced by the time you read this, is to be in two South Indian languages, Kannada and Tamil.

A frequency of 6035 kHz has been registered and a 49 metre band antenna constructed. The transmitter is a refurbished Marconi unit, acquired from the **Sri Lanka Broadcasting Corpo-**

**ration** and shifted from the SLBC main site at Ekala.

Puttalam is the site of TWR's 400 kW medium wave transmitter, and a further 100 kW shortwave unit is now being assembled by engineers at **HCJB's** Elhart Indiana plant in the US. This is not expected to arrive in Sri Lanka until mid-1993, but when on line will allow for operations of up to six hours daily.

**Amateur Radio Action's** shortwave notes are compiled by Craig Seager from information gathered from many sources, including members of the Australian Radio DX Club Inc.

For more information about the hobby of Broadcast DXing, details about the ARDXC and its member activities, and a sample copy of the club's newsletter, 'Australian DX News', write to: Australian Radio DX Club Inc, 258 Dandelion Drive, Rowville, Victoria, 3178. Please enclose six 45c stamps — and don't forget to mention that you read about the club in **Amateur Radio Action**.

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# 1992 AOCP Theory Course

## Part ten

By Paul Butler, VK3DBP  
Brighton, Victoria

**I**n the final analysis, amateur radio is essentially about sending information from one place to another by means of radio waves. How the information gets its ride on the radio wave depends on the modulation method used. And this is the topic for this month — **modulation**, including amplitude modulation, single sideband modulation and frequency/phase modulation.

For the Novice exam, knowing a little about each was enough. But now that we're in the big league of would-be full-call (AOCP) amateurs, more is required of us. We'll follow the syllabus pretty closely, then, and end up with some questions for you to agonise over.

Oh, by the way, there is an international agreement about how modulation methods are named, using a sequence of symbols determined by the **International Telecommunications Union (ITU)**. These designations are totally confusing and change from time to time.

They consist, in their common abbreviated form, of three symbols. The first indicates the type of modulation of the carrier (double sideband, single sideband, frequency modulation, etc), the second the nature of the signal (one or more channels, analogue or digital, etc) and the third the type of information to be transmitted (telegraphy, telephony, video, etc). We'll include some information about some of them here. Let's hope they make some sense to you by the end of the article! Read on...

### Some definitions

#### Carrier

The **carrier** is a radio wave in its simplest form, before any information is imposed on it by modulation (see below). It is a wave of single fixed frequency and constant amplitude (size).

Note that the simplest way to use a carrier to 'carry' information is to toggle it on and off according to some predetermined code, usually the Morse Code. This does not count as modulation, however; telegraphy uses a quantised unmodulated carrier, so its WARC designation is typically **A1A**:

**A** = Double sideband

**1** = Quantised (or digital) information without modulation

**A** = Telegraphy for aural reception

Using the same system, telegraphy sent using a sideband transmitter would be designated **J1A**.

#### Modulation

A radio frequency (**RF**) carrier has characteristics which can be varied (**modulated**) by a signal, usually of audio frequency (**AF**), being imposed upon it. The most common aspects of a carrier which are modulated are its **amplitude** (size), **frequency** or **phase**.

A **modulator** is a circuit which brings together the RF and AF signals. It may itself produce a modulated carrier or, in some circuit designs, pass the mixture of frequencies on to drive the next stage of the circuit.

#### Demodulation

The process of retrieving the AF signal out of the carrier is called **demodulation**. It takes place in a section of a receiver called a **demodulator**. A good demodulator circuit will also minimise the effects of noise and distortion which have been added to the signal between transmitter and receiver.

#### Baseband

This is the range of frequencies occupied by the carrier before any modulation is imposed upon it. It is usually very narrow, approaching zero.

#### Sidebands

When a carrier and modulating signal meet in a modulator, four distinct frequencies emerge: the original RF carrier, the original AF signal (which is usually blocked by suitable filters) and two new products called the **lower sideband (LSB)** and **upper sideband (USB)**. The frequencies of the sidebands are the sum and difference frequencies, found as follows:

USB frequency = carrier frequency + modulating frequency

LSB frequency = carrier frequency – modulating frequency

From these formulæ, it is clear that an increase in the modulating frequency *increases* the USB frequency but *decreases* the LSB frequency.

#### Bandwidth

The total spectrum space occupied by a modulated carrier is called its bandwidth. An amplitude modulated signal, for example, occupies a bandwidth equal to twice the modulating frequency, since it extends from the lower sideband to the upper sideband. An increase in the modulating frequency increases the bandwidth of the modulated signal by an amount equal to *twice* the change in modulating frequency.

#### Amplitude Modulation

This term covers all forms of modulation in which the amplitude of the carrier is varied. As we learned above, the result is the production of two sidebands; the carrier itself stays at the same amplitude. A 10 MHz carrier modulated by a 1 kHz signal, for example, would produce sidebands each side of the carrier, at 9999 kHz and 10,001 kHz, as in **Figure 1**.

An amplitude modulated signal may be transmitted in the form in which it is produced by the modulator

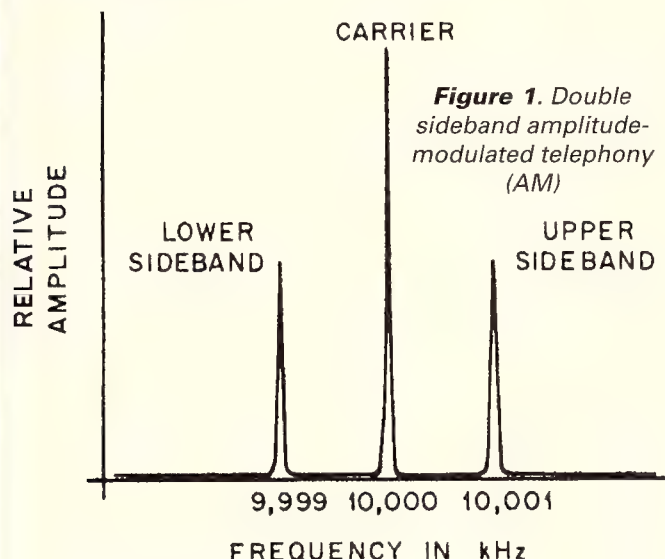


In other words, the signal will consist of carrier plus both sidebands. This is known as **A3E**:

**A** = Double sideband

**3** = Single channel, analogue information

**E** = Telephony



**Figure 1.** Double sideband amplitude-modulated telephony (AM)

Its full designation is 6K00A3EJN, meaning 6 kHz bandwidth, double sideband amplitude modulation, telephony, sound of commercial quality, no multiplexing. The highest modulating frequency is therefore 3 kHz, producing sidebands 3 kHz above and below the carrier and resulting in a 6 kHz bandwidth.

If the carrier is **overmodulated** (in excess of 100 per cent), further sidebands are generated and the result is 'splatter', which is the term given to unwanted transmissions across the spectrum. **Undermodulation** (significantly less than 100 per cent) reduces the signal-to-noise ratio at the receiver and degrades the received signal.

At 100% modulation, half the RF energy is associated with the carrier and the other half is divided equally between the sidebands. Since the carrier itself does not contain information, and since one sideband is a mirror image of the other, this is a wasteful use of radio energy. It is much more efficient to reduce or eliminate (suppress) the carrier and/or one sideband and put all the energy into what is left.

In practical terms, amplitude modulation can be achieved in two ways, using high-level modulation or low-level modulation. In the first of these, **high-level modulation**, the RF signal is generated using a crystal oscillator or variable frequency oscillator (VFO) and boosted to its final level using a power amplifier stage. This final stage can be operated in **Class C** mode for efficiency. This circuit forms a very effective CW transmitter design.

To produce amplitude modulation, the power supply to the amplifier stage is passed via a modulation transformer, the other winding of which is fed from a microphone and AF amplifier which in this case acts as the modulator. The power from the modulator adds to or subtracts from the power from the RF amplifier, depending on the signal produced by the microphone.

The power from the RF power amplifier is twice that from the AF amplifier (modulator), producing 2/3 of the output power in the carrier and 1/6 in each sideband. Because the RF and AF amplifiers produce a similar amount of power, this is called high-level modulation.

**Low-level modulation** is achieved by imposing the modulating AF signal on the RF waveform early in the circuit, where power levels are low. This allows the use of a smaller, cheaper transformer but prevents the use of a Class C amplifier. Once the modulation has been accomplished, the rest of the circuit must be linear to preserve the AM waveform and avoid the introduction of distortion. **Class A** amplification is essential, therefore, with its inherent inefficiency.

There are other ways of bringing together the RF and AF signals to produce an AM waveform. These include **anode**, **screen** and **grid modulation** using valves, and collector and emitter modulation using transistors. (Does any reader have access to *SIMPLE* practical designs that can be used to illustrate these methods? Drop us a line or fax your ideas to the Editor, **Amateur Radio Action** on (03) 670 9096).

**2.** Single sideband, suppressed carrier amplitude modulated telephony (**SSBSC** or usually just **SSB**).

The most common way to modify a full AM carrier is to suppress both the carrier and one sideband. This is known as **J3E**:

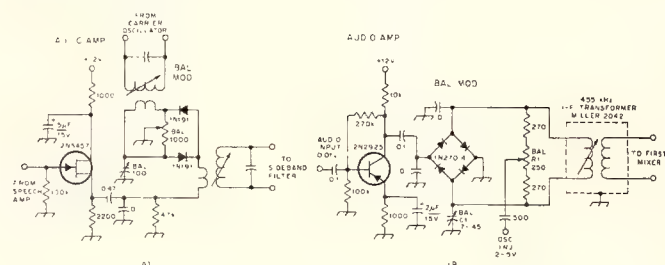
**J** = Single sideband, suppressed carrier

**3** = Single channel, analogue information

**E** = Telephony

Its full designation is 2K70J3EJN, for an SSB signal modulated from 300 Hz to 3000 Hz. To demodulate J3E signals, the carrier can be replaced at the receiver by a beat frequency oscillator (BFO). A more efficient circuit uses a **product detector**. Closely related to J3E is H3E, in which the carrier is not suppressed, producing single sideband, full carrier telephony or **compatible AM (CAM)**. As the name implies, this form of SSB transmission can be received on an ordinary AM receiver.

To generate single sideband telephony, it is necessary to suppress both the carrier and one sideband. Carrier suppression is usually accomplished using a balanced modulator. As the name implies, this circuit has a balanced state, in which no audio input produces no output — the carrier is balanced out. A common circuit includes diode rectifiers (see **Figure 2**) which block the passage of the carrier when no audio signal is present. The arrival of an audio input upsets the balance and generates the sum and difference frequencies (sidebands, which are not balanced out and so appear at the output). The output from a balanced modulator is therefore double sideband, suppressed carrier.



**Figure 2:** Typical balanced modulator circuits.

Alternatives to the rectifier-type modulator include a bipolar transistor design, in which a matched pair of transistors balances out the carrier.

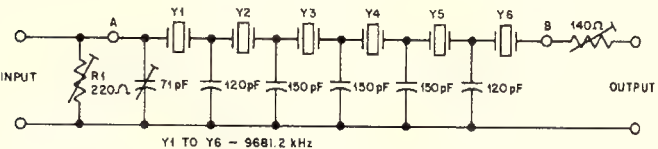
In the integrated circuit version, the diodes are encapsulated together and so are well matched, providing excellent carrier suppression.



One further stage is needed to produce single sideband — one of the two sidebands must be eliminated. Most commonly, this is achieved by filtering (carrier suppression is improved by filtering, too). Mechanical filters may be used in this situation. They contain resonant metallic discs, which are driven by an input transducer which converts electrical signals into mechanical vibrations. An output transducer converts the vibrations which are allowed through back into electrical impulses. Mechanical filters have excellent electrical characteristics, providing a very high Q—that is, they pass a narrow band of frequencies well and reject everything else effectively.

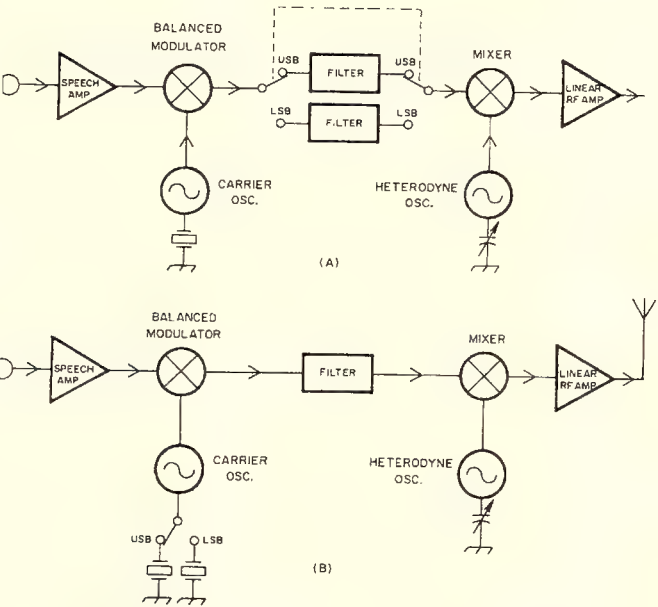
Quartz crystal filters are a commonly-used alternative, with as many as four crystals needed at each stage to provide adequate rejection of the unwanted signal. A simple two-crystal filter will include a low frequency crystal and a high frequency crystal, arranged as in **Figure 3**, and chosen so that the series-resonant frequency of one is equal to the parallel-resonant frequency of the other. The shortcomings of this simple design can be overcome to some extent by including a second pair of crystals.

A further alternative is the ladder filter, which can be readily built by the home constructor using cheap off-the-shelf crystals. A typical six-pole ladder filter is shown in **Figure 3**.



**Figure 3:** Some ladder filters based on CB crystals.

Choice of sideband is important in a transmitter design. This is managed by one of two methods, either switching from one filter to another once the carrier and audio have met in the modulator (**Figure 4A**), or by switching the crystals of the carrier oscillator and leaving the filter circuit unchanged (**Figure 4B**).



**Figure 4:** The filter method of SSB generation

## Angle Modulation

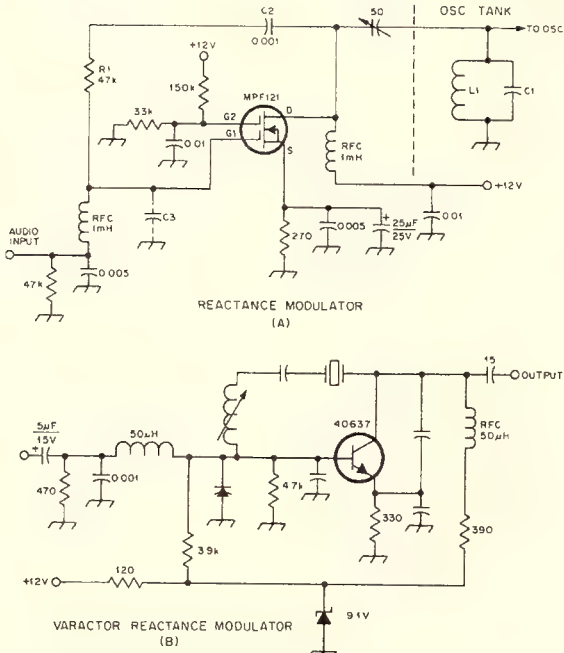
Cycles of a periodic waveform such as a radio frequency carrier repeat themselves each cycle. One way of referring to a complete cycle is to regard it in a 360 degree view. One half of a cycle then becomes 180°, one quarter 90° and so on. The angular relationship between one cycle and another is known as **phase**. The phase of a carrier may be modulated by an imposed signal, and so may its frequency. These two modulation methods are not independent, since changing the frequency also changes the phase, and vice versa.

### 1. Frequency modulated telephony (FM).

Changing the frequency of a carrier produces a frequency-modulated waveform. This mode is known as **F3E**:  
**F** = Frequency modulation  
**3** = Single channel, analogue modulation  
**E** = Telephony

Its full designation is **16K0F3EJN** for a signal of sufficient bandwidth (16 kHz) to accommodate a 3000 Hz modulation frequency and a peak deviation of 5000 Hz. This is the specification for transmissions above 29.0 MHz, and is known as **narrow-band FM** or **NBFM**. Below this frequency the bandwidth may not exceed that of the equivalent AM transmission, 6 kHz, so the designation is **6K0F3EJN**. For broadcast-quality transmissions, a wider bandwidth is used, typically 25 kHz for TV sound and 75 kHz for FM radio broadcasting. This is known as **wide-band FM** or **WBFM**. The change in the carrier frequency, or deviation, is proportional to the amplitude of the modulating signal at any instant.

An FM waveform can be generated by a **reactance modulator**, in which the reactance of a component of a resonant circuit is voltage-dependent. The audio signal is then used to drive this component, thus changing the output frequency of the oscillator. The voltage-dependent reactance is typically derived from a field-effect transistor (FET) or a varactor diode, both of which have capacitance which varies with voltage. Sample circuits are shown in **Figure 5**.



**Figure 5:** Reactance modulators



## 2. Phase modulated telephony (PM)

In this mode, the phase of the carrier is varied from a reference value. This is known as **G3E**:

**G** = Phase modulation

**3** = Single channel, analogue modulation

**E** = Telephony

Its full designation is **16K0G3EJN** above 29.0 MHz, **6K00G3EJN** below this frequency. This time, the **deviation** is directly proportional to how rapidly the phase is changing and to the total amount of phase change. Because the rate of change of phase is itself dependent on both the amplitude and the frequency of the modulating signal, the deviation increases with the amplitude and frequency of the modulating signal. This is different from frequency modulation, in which the modulating frequency has no effect on the deviation.

The phase shift is achieved by introducing a voltage-dependent reactance, as used in the FM reactance modulator, into the tank circuit of the oscillator. This means that the circuit type shown in **Figure 5B** can be used to generate phase modulation (PM) if the voltage-dependent reactance is moved in to the tank circuit. Detuning a circuit away from resonance introduces a phase shift in just the right way for PM generation.

### And now for the promised questions:

1. The output from the balanced modulator stage in a single sideband transmitter consists of:

- (a) a carrier and two independent sidebands
- (b) upper and lower sidebands
- (c) carrier and upper sideband only
- (d) carrier and lower sideband only

2. Overmodulation of an SSB transmitter will cause:

- (a) frequency instability
- (b) splatter
- (c) amplitude modulation
- (d) parasitic oscillations

3. If the driver stage of an AM transmitter is modulated and the final power amplifier stage is a linear amplifier, the transmitter is:

- (a) using high level modulation
- (b) using low level modulation
- (c) likely to have high-carrier suppression
- (d) said to have balanced modulation

4. A type of modulator which may be used in an FM transmitter is a:

- (a) screen modulator
- (b) high level modulator
- (c) reactance modulator
- (d) suppressor modulator

5. When low-level modulation is applied to a transmitter, it is necessary that:

- (a) all the stages after modulation are biased for linear operation
- (b) class 'C' amplifiers are used throughout the transmitter
- (c) the modulator operates in class 'C'
- (d) the final stage is modulated

6. In a 100 per cent modulated AM wave the percentage of carrier power in one sideband is:

- (a) 85 per cent
- (b) 75 per cent
- (c) 50 per cent
- (d) 25 per cent

7. In an amateur SSB transmitter, a practical and acceptable level of carrier suppression is:

- (a) 0 dB
- (b) 40 dB
- (c) 10 dB
- (d) 6 dB

8. In FM, frequency deviation is dependent on the:

- (a) frequency of the intelligence signal
- (b) rate of change in frequency
- (c) amplitude of the modulating signal
- (d) resting frequency

9. A balanced modulator in an SSB transmitter:

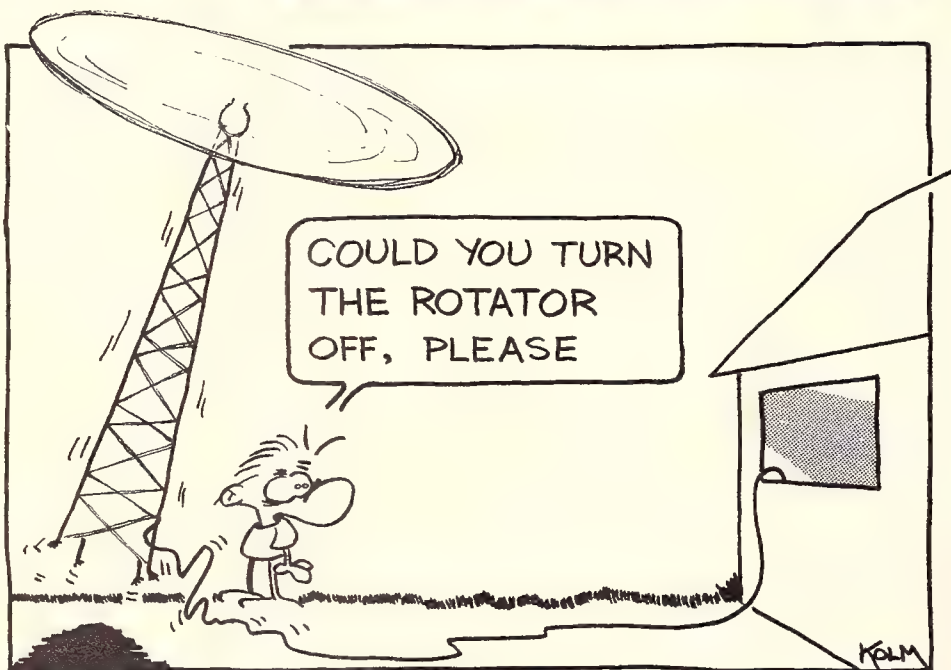
- (a) suppresses both sidebands
- (b) suppresses one sideband
- (c) suppresses the carrier
- (d) suppresses the carrier and one sideband

10. The function of the filter in an SSB transmitter's exciter section is to:

- (a) suppress the carrier frequency
- (b) suppress the audio signal
- (c) suppress the carrier and one sideband
- (d) remove both sidebands and pass the audio signal only

## Answers

1(b), 2(b), 3(b), 4(c), 5(a), 6(d), 7(b), 8(c), 9(c), 10(c)





# PACKET RACKET

Each month as I sit down to write this column I wonder what I should include next. The last few have been easy — so much information has come in that I have been hard put to decide what to leave out. This month isn't so easy, it seems that Murphy hasn't been on my side lately and I seem to have spent much of the last two months lying on my back at home or in hospital. Hopefully all of that is behind me now and I will be able to get some of the info users have sent in sorted out and ready to print in the next issue. In the mean time, thank you to those who sent good wishes after Chris's note at the end of the last column — I'll reply personally as soon as I have time.

If nothing else I have had a lot of time to think about amateur radio in general and packet radio in particular over recent weeks. So this time I think we might just ramble through a few topics that have come up in various conversations.

## Regulations

It has always intrigued me that for hobbyists and experimenters our modern amateur is a relatively unadventurous soul. This has been borne out by many conversations of recent days regarding the new regulations from the Department of Transport and Communications. For as much as the WIA is our representative body, it was pleasing to see that the DoTC chose to directly involve amateurs in the decision-making processes associated with these new regulations. In light of this we must all remember that, whilst the WIA is the only representative amateur body in this country, it does not represent *all* amateurs, let alone all amateur points of view. The policy of the WIA represents a relatively narrow sectional interest which can at times get out of step with the wishes of our community as a whole.

On the positive side I think the results of the consultation process have proven that the WIA presently does an

excellent job and is representing the views of most of us and doing so very effectively.

By now we should all have a pretty good idea of what the new regulations will *do* for all of us. (*See the next issue for an analysis. Ed.*) Notwithstanding what may come along for us in the way of extended privileges, it will be interesting to see how amateurs in general react to the new approach.

Already some sectional interest groups are girding their collective loins for the onslaught. In the last week or two I have had calls from the 'leaders' of some of these groups... saddest thing is the groups which are at the forefront of amateur radio technology are the ones with the biggest problems! Problems? Why problems? Simply put, these people are concerned that the new regulatory framework will 'lessen their influence' on the way in which their particular interest will develop. Sorry guys, you will get no sympathy from me.

The time is long past when a few people can hope to retain effective control over any aspect of our hobby as they were able to do in the not-so-distant past. Hopefully, by this time next year we will be able to look back on what has happened and see some dramatic changes, not only in packet radio, but in other areas as well.

## Who is responsible?

A few days ago I had a phone call from an amateur about some of the bulletin traffic which is appearing in this country from overseas. This particular person was concerned about the messages which relate to the modification of radios to operate outside the amateur bands. The questioner sought to establish who was responsible for the traffic which appears on our BBS systems.

Whilst the matter of responsibility has been addressed recently in the USA, I have not yet seen any discussion on the matter in this country. Maybe it is time that somebody investigated the legal question, and we may well suggest that a discussion on the ethics of the question would not go astray either.

## The offending bulletins...

In recent times I have not seen any bulletins of the type mentioned by my

last caller. But some time ago a number of bulletins about certain radios circulated here purporting to offer advice on how to modify the radios for operation outside our amateur bands. In addressing this question I will don my equipment importer and seller's hat for a moment.

Presently when a radio is to be imported into this country it needs to be certified that it cannot be modified for operation outside our authorised bands (without some very considerable effort, anyway). But some radios have been imported which *can* be modified, and the information about the modifications has been put to air via the packet medium.

Don't fool yourselves: the import of these items threatens the availability of the tariff concession for *all* amateur transceivers brought into this country. In other words, modify your present radio or import a modifiable radio at the peril of having the 15 per cent import duty re-imposed on *all* our transmitting equipment.

## The dollar catches up

For several years now our esteemed (stewed?) editor has been saying that the fall of the value of the Australian dollar against our major trading currencies would have an effect on the prices of amateur gear. Well, in recent times his dire predictions have been coming true. The landed prices of a significant number of items have crept up in the last few months, and I am sure the near future will see more such increases.

## The Kantronics KPC-3

Today as I write I received a nice little box in the mail from **Kantronics** which contained the case and final manuals for the **KPC-3** micro-power TNC I mentioned here a little while ago. The beta-test version I was using was just a circuit board, as the final packaging hadn't been readied at the time the TNC was sent to me. Now it is in the box I am even *more* impressed!

The surprise of the day was to find that Kantronics has now included an IBM-PC and compatible communications package with the KPC-3. It is known as **Pacterm (V1.03)**, and is a simple, easy to get to know terminal program written specifically for packet radio operation. Congratulations Kantronics,



maybe we can have something like this for the rest of the range in the near future?

With the KPC-3 Kantronics has also changed the arrangement of the manuals. This set consists of two books in a new 170 x 215mm format. One, a small 28-page effort, is entitled *KPC-3 — Getting Started* and covers the set-up, cabling, basic operation and software operation for the Pacterm program. The other tome is of about 132 pages and is known as the *KPC-3 Reference Manual*. It covers all of the KPC-3 commands in detail, gives more detail on interfacing the controller, and also gives the details of optional enhancements you may wish to make to the KPC-3.

I believe the KPC-3 is the first TNC which can be *field-upgraded* for increased memory without a firmware change. Instructions are given in the manual as to how the memory of the KPC-3 can be expanded from the standard 32K bytes to 128K or even 512K bytes. The 128K expansion simply involves replacing a single static RAM chip. The 512K modification is a little more involved and requires some skill with a knife and soldering iron, but even so should be within the scope of most amateurs.

An optional real-time clock can also be quite simply user-installed in the KPC-3; again, instructions are given for this modification.

## 2400 bps equipment

Until early this year a number of manufacturers offered equipment for 2400 bps packet using standard FM radios for VHF and UHF operation. My information is that these were all based on a circuit developed by Kantronics and used in its KPC-2400 TNC as well as the KM-2400 modem for Kantronics and other TNCs and in the DE2400 modem for the Kantronics Data Engine. Designs derived from this were produced by DRSI and MFJ.

Late in 1991 the integrated circuit forming the heart of all of these designs was discontinued by its manufacturer. Subsequently Kantronics and DRSI have advised that 2400 bps equipment is off the market. We were recently advised by MFJ that it has sufficient quantities of the particular IC to produce 2400 bps equipment for approximately two years, based on present demand.

Kantronics has advised that research and development activity is continuing to find a suitable design to replace the XR2123A-based one they were using. Naturally, when we hear more we'll let you know...

## Have you tried to reach me?

In the last week I have received several letters saying that my packet system, **vk3zjf-1**, was not responding for long periods. Well, during the time that Murphy had me laid low the system which normally goes for months at a time took to 'crashing' unceremoniously about once a week! It must be that damned AT board with a very sick 20mb drive which provides the on-air access on two metres and 70cm.

Hopefully it will have been replaced by the time you read this, but if you have any troubles send your packet mail to vk3zjf@vk3blw. It does get through (as soon as I kick the rotten box back into life!). That doesn't mean I will be able to respond to it very quickly, though, as my time has been a bit scarce lately!

## This month's questions...

### What does the acronym CSMA mean?

CSMA stands for **Carrier Sense, Multiple Access** which refers to the channel access methodology we use in packet radio systems. Each station (or node) uses a carrier-sensing technique to provide multiple access.

CSMA is usually qualified by appending either **CA** (CSMA/CA) or **CD** (CSMA/CD). The qualifier refers to the manner in which the CSMA access deals with collisions of data transmitted by two nodes. The CA refers to **Collision Avoidance**, whereby we use to means to avoid having two transmissions collide with each other. CD, on the other hand, refers to **Collision Detection**. In this state we permit occasional collisions to take place but provide a mechanism to detect that a collision took place.

Our present packet systems are virtually exclusively CSMA/CA systems which fail regularly!

### What is LZW Compression?

Whilst not strictly speaking a packet radio term, some users do use LZW

compression techniques to reduce the size of files for binary transfer. The acronym 'LZW' stands for the initials of the three people who devised the particular compression algorithm, Lempel, Ziv and Welch. Users of the NOS TCP/IP package will see that LZW compression is now available for FTP and TELNET sessions. For more information on LZW compression as well as Huffman and Shannon-Fano encoding you should refer to *The Proceedings of the 10th Computer Networking Conference*, ARRL 1992. It is available from Stewart Electronics (*Fancy that! Ed.*) or your WIA divisional bookshop.

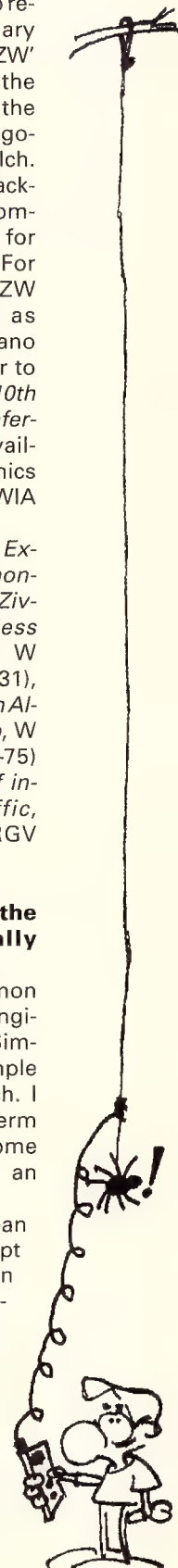
The relevant papers are: *Experimental Study of Shannon-Fano, Huffman, Lempel-Ziv-Welch and other Lossless Algorithms*, D Duek and W Kinsner, VE4WK (pp23—31), *Lossless Data Compression Algorithms for Packet Radio*, W Kinsner, VE4WK (pp67—75) and *LZW Compression of interactive network traffic*, Anders Klemets, SMØRGV (pp76—81).

### Does the name of the KISS protocol actually mean something?

No! It is a very common acronym referring to an engineering principle, Keep It Simple, Stupid or Keep It Simple and Stupid, or some such. I have no idea where the term originated, but I'm sure some of our readers will have an opinion.

It is usually taken to mean that a design should be kept simple enough that even somebody generally considered to be stupid can understand it. In the case of the KISS protocol I think that aim has been admirably satisfied.

Has that answered a few more queries for you? I hope so. 'Til next time, then, 73 from vk3zjf@vk3blw







## A truly remarkable QSO!

Andy, VK8AH in Darwin, responded to a CQ call by the DXpedition to Bangladesh by JA1UTE and JA1UPA, signing under the call S21ZE at 1400z on October 11, 1992.

Unfortunately, with only a small antenna and low power, Andy was unable to extract more than a "QRZ?" from S21ZE.

Undaunted, Andy rang Rex, VK8RH, who had higher power capabilities and a two-way CW QSO between S21ZE and VK8RH occurred at 1405z for the first-ever six metre QSO between Bangladesh and Australia.

Congratulations to both these intrepid Darwin amateurs who have not given up on the six metre band and scored a 'first' for VK with this truly remarkable contact!

## Six metres á la carte

• Operations commenced from **H44/JA1OEM**, when **Marco** was heard on Sept 25 by Shel NI6E/KH6, sending slow CW on 50.123 MHz. He was scheduled to remain in H44 until October 7.

• **Willis Island**: call **VK9WW** was scheduled October 7 to 14, but the **JA1VOK** report says it was postponed to October 12 to 19. Mellish was cancelled altogether.

• **Wallis Island**: scheduled October 28 to November 4 by three JA operators — **JR1LZK**, **JA5VBH** and **J11NJC**. All QSLs should be sent to the latter. Operations will be on all bands 160 to 6 metres. (See full report below.)

• **Jimmy**, **W6JKV**, is planning to operate from **FG7, Guadeloupe**.

• **T3ØJH** worked KH6 and heard beacons from P29 and VS6. (See full report below.)

• **VK8RH** had lunchtime propagation to **KH6/NI6E** on Sunday, September 27. He also recently contacted **V85PB** and **HL9UH** on 50 MHz and **JA4EKA** on 144 MHz SSB.

• **Richard**, **AH6IO** operated as **V73IO** from Bikini Atoll from September 28 to October 8.

• **Hiro**, **JD1BFI** has left his employ at the Marine Ranch, Ogasawara Island, and requests that all cards be sent to **JA5FFJ**, who is his QSL manager.

• QSL route for **BV7JA** is TL Su, PO Box 32-12, Kaohsiung, Taiwan.

• QSL route for **BZ4SBV** is PO Box 51, Suzhou, China.

• **PY5CC** has now worked three more countries — **EH**, **EH6** and **EH9** — to total 148.

## DXpeditions abroad

**VK4BRG** sent a packet message with this news: "A couple of DXpeditions around Brazil are soon to take place: Feranado and Trinidad were mentioned... with PYØCC involved in one. I must say, due to the difficult path from this QTH, that I didn't take too much notice of the PY details. Earlier today, NI6E/KH6 had an hour or so of South American propagation."

*This report via packet from VK4BRG.*

## DXpedition to Wallis Island

**Yutaka Tasaki**, **JR1LZK/3D2YN**, **Yasunori Iitsuka**, **J11NJC/3D2YI** and **Shinji Shimada**, **JA5VBH/3D2ST** will be on the air from FW, Wallis Island, for one week's operation from late October.

Their current itinerary is as follows.

**Oct 28**: Arrive Wallis Island and receive the licences.

**Oct 28 to Nov 03**: DX operation using one callsign only.

**Nov 04**: Leave Wallis.

Operations will cover all bands from 160 to six metres, including the WARC bands. CW and SSB shall be the main mode of operation, and RTTY operation is now under consideration.

QSLs are invited through: Yasunori Iitsuka, J11NJC, 191 Sugaya, Nakamachi, Naka-gun, Ibaraki, 311-01, Japan. Please enclose an SASE. (This excludes Japanese stations. QSL for Japanese JARL).

*73 de J11NJC/3D2YI @ JA1OHZ.JPN.AS*

## H44 also

**JA1OEM** arrived in Honiara on September 21 to commence a 14-day DX operation on six metres. The callsign was H44/JA1OEM, and a packet mes-

sage from **VK4BRG** reported a **KH6** to **H44** path had occurred early on.

No QSL route had been established by press time, however.

## A report from T3ØJH

Jack has been residing on Tarawa since mid-year, and recently started to sustain TE propagation to **KH6** during the evenings as well as hearing beacons from Hong Kong (**VS6SIX**) and Port Moresby (**P29BPL**). Jack receives the **KH6HME** beacon daily, usually followed by the one at **KH6HI**, both in the 0700z to 1000z period.

He has worked **KH6IAA**, **AH6LR** and **NI6E** on September 25 around 0800z and copied the **VS6** beacon at 0942z for 30 minutes, followed by the **P29/B** for a further 30 minutes.

## A report from Japan

**UL7GCC** heard the **JA6YBR** beacon on July 18 around 1100z, but was unable to make any contacts. Drago, **YU3ZV** worked 21 stations in JA1 as well as one JA3, four JA7 and two JA8 calls, via a multi-hop E layer path on July 26 between 0830 and 1020z. **DJ1OJ**, **DL7AV** and **DL7QY** worked four JA1 stations, six JA2s, six JA8s and three JA9s between 0922 and 1045z on July 26 also.

**Yutaka**, **JH1WHS/VK2WHS** and **Hat**, **JA1VOK** report the following contacts made from JA:

**July 12**: **NI6E/KH6**, **AH6LR**.

**July 13**: **HL4CSL**.

**July 18**: **VK4JH**, **VK4TL**, **VK4FP**.

**July 20**: **EKØLJA**.

**July 25**: **HL4CSL**, **BV7BB**, **BV4FG**.

**July 26**: **YU3ZV**.

**Aug 02**: **BV7JA**.

**Aug 04**: **BV7JA**.

**Aug 08**: **VK4s DO TL**, **FP** and **ABW**.

**Aug 10**: **VK4TL**, **BY4s RSA**, **SBP** & **RB**.

**Aug 11**: **NH6YK/KH4**, **VK4TL**, **BY4RB**.

**Aug 12**: **BV7JA**.

**Aug 14**: **BV7JA**, **VK4JH**, **VK4TSD**, **VK6PA**.

**Aug 16**: **BV7JA**.

**Aug 18**: **VK4TL**.

**Aug 20**: **VK6RJ**.

**Aug 21**: **HL5JDV**, **HL1KXS**, **BY4RB**.

**Aug 22**: **BY4RB**, **BZ4SBV**, **BZ4SZ**.

**Aug 24**: **VK4ABW**, **VK4FP**, **VK4TL**.

**Sep 08**: **VK4FP**, **VK4TL**.

**Sep 16**: **VK4BRG**, **VK4TL**.

**Sep 17**: **VK4KHQ**, **VK4FP**.

**Sep 19**: **VK4ABW**.

**Sep 21**: **VK4PU**, **VK4TL**.



## By Steve Gregory, VK3OT@VK3JAV

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Yutaka visited VK4 from May 19 to 25 and operated as VK2WHS/4 from Cairns, Townsville and Brisbane.

### A report from Europe

No column would be complete without the list of goodies worked by the Europeans! July logs show short-range E-layer communications with the following, from the UK and Scandinavia:

3Z5PAR, 4U1ITU, 4X1IF, 7Q7LA, 9A1EZA, 9A2SB, 9A3AQ, 9K2ZR, CT1BH, CU1CB, EA8/DJ3OS, EH2AGZ, EH3ADW, EH3KU, EH6FB, EH7AG, ES1CW, ES5DE, ES5MC, ES6PZ, ES9C, I2ADN/IH9, LA5TFA, LY2WR, LZ1BB, LZ1KDP, OHØNYW, OK3CLS, OK3OM, OK3TPG, RA3YO, SN5PAR, SV1UN, TA4ZA, TA6/OZ1DOQ, UA2F, UX1A, YU1EU, ZA1A and ZC4KS.

Just a few of these stations could come within our range this Equinox, so good luck!

### European beacons

50.000	GB34BUX	IO93	15W T/S.
50.015	SZ5DH	KM27	05W 4LY
50.016	4N3SIX	JN76	10W 5LY
50.020	GB3SIX	IO73	25W 3LY
50.021	OZ7IGY	JO55	30W T/S
50.023	LXØSIX	JN39	05W DIP
50.025	OH1SIX	KP11	50W XDP
50.026	9H1SIX	JM75	07W GPL
50.030	CTØWW	IN61	40W DIP
50.035	ZB2VHF		30W 4LY
50.040	SV1SIX	KM17	50W VDP
50.042	GB3MCB	IO70	10W DIP
50.050	GB3NHQ	IO91	15W T/S
50.051	LA7SIX	JP99	20W 4LY
50.057	TF3SIX	HP94	15W 5LY
50.060	GB3RMK	IO77	40W DIP
50.0625	GB3NGI	IO65	25W DIP
50.064	GB3LER	IP90	45W DIP
50.0655	GB3IOJ	IN89	10W VDP
50.067	OH9SIX	KP36	35W T/S
50.070	EA3VHF	JN01	0.2W VDP
50.080	SK6SIX	JO57	10W GPL
50.314	FX4SIX	JN06	50W XDP

Tnx JA1VOK.

### Early warnings and early days yet

Word from the west, from **VK6RO**, reports the first JAs into Perth for this part of the year arrived on Sunday, September 13.

49 MHz TV signals have also been widely reported from VK2, 3, 4, 6 and 8 areas, with particular emphasis on the 0400 to 0600z time slot. The US high-power pager transmitters in the 35 to

36 MHz band have been audible on the east coast up to 0200z daily along with some two-way radio services in the 34 to 35 MHz segment.

NL7OW, Tom has been up on 28.885 MHz liaising with Oceania and hoping to make further contacts into Australia in the 0200z time slot. He suggests we watch for the Pegasus M/S burst transmitter on 46.900 MHz and normal voice traffic on 45.240 MHz with a CW identification code.

The transmitter on 42.4 MHz operated by Meteor Data Inc, is at 61° North and 150° East in Anchorage, Alaska, while the 40.690 MHz transmitter, which runs 2.5 kW into 9dB gain (ouch!) is at 61° North and 149° East.

The US Air Force M/S systems are located in Oregon, Florida, Utah and Colorado, to name but a few, and translate data from 49.93 MHz to 40.690 MHz.

There is also another system on 43.100 MHz, which is somewhat secret, but is heard world-wide, as was the 44.8 MHz burst transmitter at Salisbury, South Africa, which remains silent. That transmitter is due to be relocated to Davis Base, Antarctica, this summer season, so it may not be much use for our overseas friends, but could provide us with an early warning signal from VKØ.

The installation will consist of 1kW and a pair of side-by-side 5-element Yagis beaming to McMurdo Sound. The 46.800 MHz pager frequency has only limited use, as the highest power licensed is 50 watts — and most of these are indoors!

### Auroral activity

**Geoff, VK3AMK** reported auroral backscatter signals from both Tasmanian beacons on Thursday, September 17 from 0500z until 0800z. VK7ZMF worked VK1 and VK3 regions on six and two metres and heard ZLTV on and off during the afternoon.

Please remember the column relies on *you* for the news, which I'll most gratefully accept via fax on (055) 71 2222, or via packet radio or mail to the details shown at the top of the column.

See you on the magic band! 73 de Steve, VK3OT.

(Make sure you check out the lift-out *Six Metre Australian DXCC list* on pages 34 and 75 of this issue! Ed.)



Well, after a busy couple of months I'm back with time to sit down and catch up with the few letters and requests for help received — and to those who have been waiting for replies, my apologies.

In late August I received a phone call from a member of the **Tamworth Radio Club** looking for some help in setting up foxhunts for a field day on November 17. If you think you can help please get in touch with me and I will pass your phone number on.

A couple of months ago I mentioned that it appears that **Gosford Field Day** just may have foxhunts going next year. Well, an update to this is that it appears even *more* likely now, as I have been approached to help run them! So you will have a chance to see how good (or is that how *bad*) I am at hiding transmitters in multi-transmitter mobile and pedestrian hunts. Come to think of it, I had better spend some time in Gosford or Wyong (they still don't know where it will be held!) to find some good (or should that, too, be *bad*) locations.

While engaged in one of my relaxing pastimes of reading old magazines, I came across a form of foxhunting which you may have already thought of (I certainly hadn't!), but for those newer to this aspect of amateur radio I will explain the **Alphabet Hunt**.

Firstly, it is called the 'Alphabet Hunt' because the fox is required to hide at, near or in a place in some way connected to something which starts with a specific letter, which is decided on the previous hunt. Ok in some ways this does restrict the fox as to where he goes to ground but this is where the ingenuity (read warped mind) of the fox can come into play. Also the fox then has a couple of weeks to find a location and work out the required clues.

What is allowed and not allowed? Well, firstly RDF gear and questions



which rely on geographical features (ie are you south of Sydney Harbor?) are definitely forbidden. (*If they were playing that game here the answer to that question would probably be yes! Ed.*) The answers to the fox's location is not given over the air, as to do so would spoil the fun for others, however if it can be done a trusted person who can be contacted by phone, may know the fox's location so that possible answers may be checked. The advantage of this is that it allows people to take part who may not have access to a car.

All proper operating procedures must be followed. Clues and answers must remain within the bounds of good taste (who knows *who* may be listening?!). Pauses must be left (on a repeater frequency) so that others may use it as required. Clues are given every five minutes with a new one given after the previous one has been answered. Obviously these clues may be answered and discussed on air. Questions which are asked (concerning the clues) must be able to be answered Yes or No, as for normal talk-in events. Oh yes — there's no time limit.

The winner is the person who either phones in with the correct location or arrives there first. Obviously, the fox and the person with the phone must remain in contact.

I'll try to give an example of the clues and questions, and to those who don't know the City of Newcastle, my apologies for a section which may not make too much sense to you. The letter designated to the fox is 'B'. The fox announces his first clue of the evening as "Joan of Arc was one near here". (Joan

was the Martyr, of course, but the cryptic clue actually refers to The Mater Hospital).

The next clue may say "Courting couples may do this." The answer is 'park'. Obvious if you think about it... After a few more clues the fox may end up with "Where I am may make an ass of me". To anyone who knows Newcastle it should then become clear that the fox is hidden at Braye Park, which is near the Mater Hospital.

While these clues are being given, some hunter may misinterpret the first clue and place an emphasis on Arc, so he may ask a question along the lines of "Has this site something to do with electricity?". Unfortunately (or fortunately!) the answer in this case would have to be yes, as the local electricity body has a sub-station near the bottom of this park. In a sense this may be good, as the questions asked may throw some people off track, and I have used questions to do just that in the past. Knowing the letter which must be involved, the same hunter may read the second clue to refer to a beach and so on.

The clues can be as easy or as hard as the fox decides, and may be plain text or cryptic. In fact, there's another twist which could be added to it — make the clues in the form of a crossword puzzle that is handed to the hunters after the fox has arrived at his chosen location.

I hope some of you may try this fun event and either write to me at the address shown at the top of this page or leave messages on packet BBS **VK2TSC@VK2CZZ**.

Again, I am going to beg you for ideas for future columns... please tell me what YOU want to read. For example, I have received requests for an index of articles involving RDF from both this and other magazines and, unless the Editor has reasons for not allowing it, I will organise this over the next couple of months — it might make a good way to start the new year. (*That's fine by me, Simon. Go right ahead! Ed.*)

The Westlakes club ran its first Pedestrian Hunt on the weekend of September 26. It was also the first two-transmitter hunt for the club's new generation of hunters. Not only was this a good training for the forthcoming field day, but it gave me a chance to try the 'new' (well, old, really) low-power fox made from a Kenwood TR-2200A.

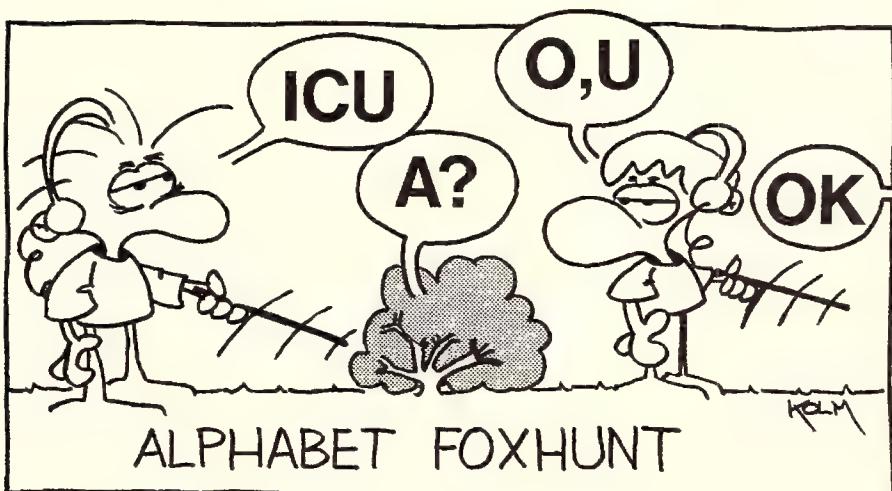
I'll be honest: the new fox was a failure. The problem was that the ordered crystals arrived only the day before the hunt, so they were promptly installed and the transmitter fired up. Great signal (off scale) showed on the FT-212RH which sits on my desk, but a walk outside showed *no* signal just one house past my own — and that was with the fox plugged into a J-Pole mounted 30 feet high! A quick check seems to indicate that the finals and/or driver were not operating.

The moral to the above? Never leave things to the last moment and don't believe people when they tell you 'Yes, it works!'. Anyway, a replacement fox was arranged — my Icom IC-02 was mounted on a heatsink bigger than the radio itself, and the sidetone output of a keyer was fed into the mic socket. The keyer was set at around 15 wpm. It worked and stayed cool; the only problem was that I was spotted down near the fence which runs parallel to the Newcastle-Sydney railway line, and the observer called the police with a report of a bomb being planted!

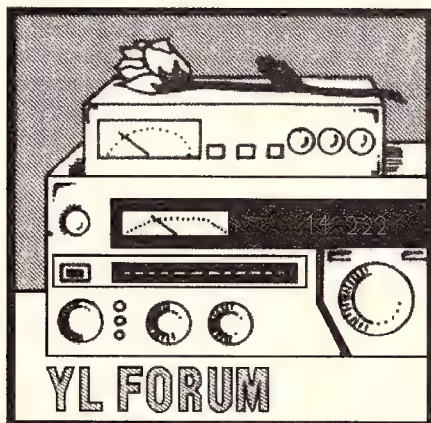
Oh well, at least the policemen had a good sense of humor, as we stood quietly together and watched people running around on the wrong side of the railway for quite a while. Who *said* Neighborhood Watch doesn't work?

Anyway, I guess that's all for this month. Once again, let's hear from some of the foxhunting groups out there, and I don't care *what* state you are in. (*Inebriated in all likelihood! Ed.*)

73 de Simon.







## Incommunicado

The advent of a new all-singing, all-dancing telephone exchange on Norfolk Island was preceded by thorough preparations. Months before the event all subscribers were informed that we would have new telephone numbers, ie the old one preceded by a '2'.

As the Great Day drew nearer we received more information on what the new system could do for us. Not only would we get a print-out of the numbers we had called attached to the monthly bill, but there were a number of other facilities available; **call waiting** to inform the subscriber that another call is waiting during a conversation with another party; **inquiry service** to enable the subscriber to call someone else in the middle of a conversation; outgoing call barring with individual **PIN numbers**; **hotline service**; **call diversion** for those who cannot live away from the telephone, and God knows what else. Good nuisance value and not a mean lot of gimmicks for only \$1.4 million!

The island's 2000 inhabitants took it all in their stride. Just as long as we can make an old-fashioned call to the local 'take-away' or even occasionally call Sydney or Auckland, really. But a list of numbers called will be a godsend — just to make sure some b... has not been in here using our phone. You just never know!

Updates on the changeover date were published in the local paper, with September 7 being advised as D-day. During the first week in September local businesses and others took every opportunity to inform regular overseas callers of the change due to take place. It was only a couple of days before the big day that the change-over was fine-tuned to "midnight September 7."

My ingrained radio way of thinking balked. Did they mean 2359 or 0001 when they talked about midnight? It

was at this point that a niggling doubt took hold. Would the changeover go smoothly? Midnight? Hmmm...

The big day came and went and, as it turned out, midnight had meant 2359, so the change did not actually take effect until the eighth. Still, what is a day more or less in a millennium?

To begin with I liked the new order of things. The phone was quiet and so was the fax machine, both at work and at home. It was almost like old times, back in the early '80s when overseas dialling was akin to science fiction as far as Norfolk Island was concerned. But Jim was restless. Could it be possible that *nobody* in the whole wide world wanted to talk to us on the phone? "What would they want to talk about?" said I, worried in case he should do anything to upset the peace. "Leave well enough alone!" I begged.

But all good things come to an end. After three days the telephone rang. It turned out to be Chris, NO1Z from Connecticut, USA, who said he had had no end of trouble getting through after being told by the disembodied voice of the networks that the number he had dialled was disconnected and to check with his local telephone exchange. It was only due to the prolonged persistence of his local operator that he finally succeeded in making the call.

Jim was not happy about the 'disconnected' statement, considering it misleading. He telephoned Norfolk Island's Telecom office.

"That's right," said the Telecom manager, "the number *is* disconnected." "Could the announcement be changed to something more informative, like that the number has changed and how to dial?"

But no. That had *nothing* to do with Telecom, it seemed, and it was *far* too busy to worry about such minor details like whether the new equipment was of any use. In any case, we were assured that everything was working fine "...because nobody else has complained".

So Jim telephoned OTC and was this time met with more co-operation. A quick check and it was agreed that the announcement was meaningless. A more instructive announcement was soon in place, but still the expected calls failed to eventuate. Two days later a phone call from Bob, W5KNE in Texas

alerted us to the fact that Bren, G4YDO was trying to get through from London, dialling our new number, including the magic '2' but with no luck.

Jim rang OTC once again. Although it was Sunday, the technician there was on the ball and alert to possible problems. He made a few checks and rang back later to confirm that his suspicions had been correct. Apparently the 'window' for Norfolk Island only allowed for four digits so that when the extra '2' was inserted, the last digit dropped off. Consequently the announcement now told the caller that the number he had dialled was incorrect and to please check etc. On the bright side, we now knew that Texas was okay, so that was a start. On the other hand, a letter written in England on September 19 told us that the writer had been told to 'check the directory' when he tried our old number. His comment was that this was okay on Norfolk Island but did not work very well in England.

Exactly how the world at large is informed when some obscure backwater moves with the times within communications is a mystery. Especially after Jim was asked with childlike confidence by the Manager of Norfolk Telecom whether he had informed all (ALL!) our callers that our number had changed. How very remiss of us to have thought that sort of information was taken care of by the professionals. There must have been a break-down in communications at the professional communications level.

And so another batch of faxes was sent off to the far corners of the world, ie the USA and Europe. I dread the thought of September's phone and fax bill, but obviously *somebody* had to do something for the good of the community. The island is not yet out of the woods. Three weeks down the track Telecom's Norfolk Island manager, in a quarter page advertisement in the local paper, is asking people on Norfolk Island to inform him "...if you know anyone overseas who has difficulty dialling Norfolk Island."

It is good to know that he, too, is now aware that there is a problem. Not everyone has access to amateur radio in order to learn quickly that the \$1.4 million improvement in communications in its first few days served largely to keep the island incommunicado!

By Kirsti Jenkins-Smith, VK9NL

PO Box 90, Norfolk Island, South Pacific 2899





One of the most interesting bits of amateur radio news to hit the bands in the last couple of weeks is that it appears that the ban on amateur radio in Ghana is to be lifted in 1993.

To be more specific, it seems that Ghana's constitution will return to civilian rule on January 15, 1993 and, with that in place, amateur radio will again be a legal activity.

This news came via **John Longhurst, G3VLH/C53GV**, in Accra, Ghana on business. The source of his information is **Kofi Jackson** who is **9G1AJ**, but who is also the director of the Ghana Frequency Registration and Control Board. This is, of course, wonderful news, and not only in terms of DXing. As more and more countries choose a more democratic path freedom of the individual becomes important once again. In Ghana at the moment attempts are being made to re-establish the Ghana Amateur Radio Society. Let's wish the amateurs of Ghana the best of luck for the future... and *welcome back!*

The bands have continued to be very spotty, and conditions have been diabolical. Then again, we have become accustomed to a long period of great propagation in recent years. However, things appear to be picking up a bit and there have been some good band openings.

## HA5BUS

The **Globex Foundation** reports that the main sponsor of the Hungarian group world DXpedition, **HA5BUS**, has become insolvent. As a result of this the group, currently in Australia, is in financial difficulties. If you feel that you can help please send any funds to: **Globex Foundation**, PO Box 49, 1311 Budapest, Hungary.

## Bangladesh

**S2**

It was a strange turn of events which had Kirsti and I working **Bob, S21ZD** the other day on the ANZA Net. Bob had written to me several months ago regarding licensing in Bangladesh and I was in a position to bring him up to date. After making his application, he had also been granted a one week license and decided to split his operation into two parts, one in Dhaka and the second part in the west of the country. He is in Bangladesh for a couple of months on a technical project.

**QSL Route:** callbook address.

## DXCC News

It was reported in an ARRL news release dated September 14 that documentation for the following operations has been received and has been approved.

The **5R8JD** operation beginning July 6, 1988. (QSL cards for this operation were previously rejected, but the **5R8JD** QSL can now be re-submitted).

QSL cards for the following operations may now be submitted for credit.

The **S92IJ** operation beginning March 10, 1992.

The **7Q7CE** operation beginning June 4, 1992.

The **ZA/KA6ZYF** and **ZA/G3MHV** beginning June 13, 1992.

The **F6BLQ/D2** operation beginning June 23, 1992.

The **XU0NU** and **XU1NU** beginning July 6, 1992.

The **S21ZA** operation (by **VK9NS**) beginning August 1992.

## News from Russia/CIS

The **Radio Federation of Uzbekistan** requests that QSL cards be sent to the following address: **UI QSL Bureau**, PO Box 73, Tashkent, 700100 Uzbekistan.

A recent letter from a UA station reported that the renowned **PO Box 88**, Moscow, is now more or less defunct and is highly inefficient. There is now a charge for handling QSL cards, and in an attempt to cover costs for the QSL service, a 'user pays' charge was applied.

This has been met with considerable resistance and many simply cannot pay for the thousands of cards coming in via the various bureau routes.

(Note: See later comments under **QSL???**)

QSL cards for the recent operation of **4K1A** are now being answered. The **UZ1PWA** group made some 22,000 QSOs on all bands from Molodezhnaya.

**QSL routes:**

**4K4LC** **UA6LU**, PO Box 416, Rostov on Don, 34407 Russia

**4L1FDR** **UF6FFF**

**R600SR** **UZ1QWX**

**RI1UMD** **UI9BWO**

**RO0Q** Slawa Lysy, PO Box 112, Kishinev 277012, Moldova, Europe.

**UL41/UZ9AWD** **UA9AQN**

**US76BL** **UB4BYU**

## Aves Island

**YXØ**

The QSL cards for the **XYØAI** Aves Island operation should be in the mails in the coming month. The delay is partly due to the fact that the QSL cards are being printed in Germany. Please do not re-QSL at this time.

## South Sandwich VP8SSI

The QSL cards for this major DXpedition to South Sandwich are now being received by the needy. In fact, here on Norfolk Island Kirsti and I received our cards back in mid-September. My **VP8SSI** QSL card is already on its way to DXCC, as it confirmed my *last* SSB country. (Well done Jim! You've joined some pretty exalted ranks there. Ed.) The QSL is very attractive and worth waiting for. Please do not re-QSL at this time.

## Yemen

**7O**

A persistent slim is signing **7O1ZZ** asking for QSL cards to either **VE1ZZ** or **VE7ZZ**. He was active again last night on 21,014 kHz CW.

## Trinidad Island PYØT

There are a number of VK stations trying to get a QSO with the current operator on Trinidad Island. He is reported as being **PYØTUP**, and with the military on the island.

Meanwhile, **PYØ/T**, Trinidad may be the target for another DXpedition, according to **PT7WX**. This one appears to be a tough area for many of the VK areas, so let's hope these DXpedition rumors are correct.

## Bahamas

**C6**

The special callsign **C6A500** was being used by the Bahamas Amateur



## Compiled by Jim Smith, VK9NS

PO Box 90, Norfolk Island, South Pacific 2899

Radio Society during October to celebrate the discovery of the 'new world' by Christopher Columbus. In addition individual members may append /500 to their callsigns for the same period.

### Special callsigns

#### QSL information

##### G100SBC

PO Box 88,  
Rayleigh,  
Essex,  
England  
or via Bureau.

##### SP0TPM: SP6TPM

##### YN0TI:

##### T12MCL

PO Box 49-1017,  
San José 2000,  
Costa Rica.

##### YV500RCV:

Radio Club Venezuela,  
PO Box 2285,  
Caracas 1010-A DF,  
Venezuela.

##### 3Z0EMC

Zenon Petrak, SP6FER,  
PO Box 2156,  
50-985 Wroclaw 47,  
Poland.

##### 3Z25PAZ: SP6TPM

### Kermadec Island ZL8

**Bob, ZL4DO** was again on Raoul Island during September for a short stay and was active as **ZL8RS**. Bob had limited time to operate due to his work commitment. Kermadec is still quite high on the wanted list.

**QSL Route: ZL4DO**

### Cambodia XU

**Antoine, F6FNU** reports that there are several stations QRV from Cambodia — **XU0NU, XU1NU, XU2NU** — and all these stations are members of the French UN team. Documentation has been sent to ARRL (see previous notes on DXCC News)

#### QSL Route:

**Antoine, F6FNU,**  
PO Box 14,  
F-91291,  
Aeapajon Cedex,  
France

It is also reported that Manfred, DJ4OF has been signing XU4OF.

#### QSL Route:

**Manfred Schneider, DJ4OF,**  
Lerchenweg 15,  
D-3123 Bodenteich,  
Germany.

### Angola D2

**Carlos, D2EL** continues to be very active from Angola and is there until mid-October. He is installing broadcast and data service equipment. On the 14,222 kHz DX net the other day Carlos had a tremendous signal on the long path, and worked many of the VK/ZL and Pacific stations.

#### QSL Route:

**José Carlos Perez Cervera, EA7EL,**  
PO Box 13325,  
41080 Sevilla,  
Spain.

### Central African Rep TL8

There has been quite a bit of activity from **TL8** recently with **TL8NG** back from a vacation in the US and **TL8DF** is reported active.

#### QSL Route for TL8DF:

Patrick Labeaume,  
137 Rue De La Gaucherie,  
F — 5300 Laval,  
France.

### Clipperton Island FO0CI

It is reported that the **FO0CI** cards are being received in the VK area. **N7QQ** reports that he is QSLing steadily and that all cards should be out by the end of October. Do not re-QSL at this time.

**QSL Route: N7QQ**

### Baker/Howland Is KH1

It is believed that the DXpedition to Baker and Howland has been postponed until 1993.

### 73 Magazine awards

In a recent notification, *73 Magazine* stated that the only award which it currently authorises is the 'DX Dynasty Award' and applications for this award should be made to 73's normal mailing address. Apparently a former awards manager has been receiving applications for the previous awards program and keeping the money...

### Heard Island VK0

A few days ago (as I write this) **HIDXA** abandoned the idea of a DXpedition to Heard Island this summer season. The major DX outlets were informed accordingly. The decision was based on the simple matter of finances and an apparent lack of interest from the DXers.

Heard Island lies at number five or six on the 'wanted' list and a couple of relatively simple operations (relative to the remoteness and difficulties with Heard Island) would change the picture over night.

### Willis Island VK9W

The DXpedition to Willis Island has just taken place, running from October 12 for a week. **Kirsti VK9NL, Atsu VK2BEX** and **Jim VK9NS** were the team. The callsign was **VK9WW**, and for specific YL country contacts Kirsti was signing **VK9NL/Willis Island**.

### Pakistan AP

**John, AP/WA2WYR** has finished his activity from Pakistan. Note that there is new QSL information.

#### QSL Route:

**Ken Swanson, KK6TX,**  
941 Jennifer Street,  
Incline Village,  
Nevada 89451  
USA.

### Iran EP

The recent operation by Romeo from Iran, signing **9D0RR**, made some 22,500 QSOs.

#### QSL Route:

Romeo, **9D0RR**  
PO Box 766,  
Brooklyn,  
New York 11230  
USA.

### Cayman Islands ZF

Ken, signing **ZF1WD**, was a booming signal here the other day on 20 metres. He was on Little Cayman Island.

#### QSL Route: G4RWD

(His home call.)

### Market Reef OJ0

It is anticipated that a DXpedition to Market Reef will sign **OH1AF/OJ0** on the normal DX frequencies. The dates



for the proposed DXpedition were given as October 7 to 14.

#### QSL Route:

CW QSOs **OH1NOA**  
SSB QSOs **OH1EH**

### Eastern Kiribati T32

The recent high activity from Christmas Island was by a group of radio amateurs from California. The group was basically in place for the RTTY contest but it was planned to be active on other modes, all bands.

#### QSL Routes:

To home calls as follows:

**T32RA** **KN6J**  
**T32RS** **N6OXR**  
**T32GV** **W6OTC**  
**T32CW** **NI6T**  
**T32WS** **WU6A**  
**T32SS** **KE6KV**  
**T32GG** **KE6GG**

### Chad

### TT8

It is reported that **Ken, WA4OBO** was to be active from Chad, TT8, during October. No callsign was given.

**QSL Route: WA4OBO**

### QSL???

Comments made by a UA station (see 'News from Russia' above) sound familiar to me. It has been the basis of every single comment I have made over recent years about Bureau QSLing and QSLing in general.

Only a state-run system such as the old *Box 88, Moscow* could possibly have carried the endless and mindless hundreds of thousands of USSR SWL QSL cards, for example. No ordinary radio amateur could possibly have afforded to print cards, get them to the bureau and get them back from the bureau on such a massive scale unless everything was for free.

**Neil Penfold, VK6NE**, QSL bureau manager for the VK9/Ø area, is in print (in *QRZ DX*) as saying that he holds thousands of unclaimed QSL cards for VK9 stations mainly of the DXpedition variety. This story, of unclaimed bureau QSL cards, is repeated *ad infinitum, ad nauseam* at any QSL bureau one cares to mention.

Returning to the VK9 area for a moment, then, here is his Neil's list of VK9 stations who do *not* accept bureau QSL cards.

#### Station

VK9ZM and VK9VW  
VK9LA and VK9LM  
VK9LA  
VK9NKG  
VK9XT

(**Not** VK3OT, who was there in 1980 and 1982)

VK9YT 1988

(**Not** VK3OT, who was there in 1982)

VK9ND Bob, Norfolk Is  
VK9LS JK1LKH

\*\*\* VK9NL Yes, Kirsti has asked to be added to the list.

My own policy has always been to try to keep the VK9 bureau clear of my cards. I refund any postal charges incurred by the VK9 bureau manager in forwarding the many kilos of bureau-type QSL cards.

What is needed, worldwide, at the national society level, is a massive re-think about QSL services for members. The QSL bureau should *not* be a part of the membership fee as, in my view, one should not join a national society merely for a cheap QSL system.

Until society members are specifically paying for the handling of each and every one of their QSL cards, the unwanted deluge will not stop. QSL cards are going the rounds in their millions, an endless merry-go-round and a gigantic waste of resources.

Thousands of radio amateurs re-QSL their logs for specific QSL cards (from countries they need) at intervals of several months. Societies specifically pay

#### Manager

NM2L (1989)  
DJ5CQ (Current)  
VK3WA (1983)  
1988  
1988

staff to have cards sorted, mailed and handled in general. Yet mention QSLing outside the bureau system and heads are raised. What about amateur radio spirit, the final courtesy of a QSO is a QSL card and so on? No one denies the pleasure that a QSL card can bring, maybe this is especially so if one is a DXer. The simplest of arrangements is a statement along these lines: QSLing has to be a mutually-agreed arrangement, made at the time of the QSO, between the two stations making the QSO (for which a QSL card is desired). It has to be noted that, in some cases, 'via the bureau' may not be a viable option. There is little point in dumping yet another card in the bureau if this is not going to work. As another aside, less than 50 per cent of radio amateurs are members of a national society.

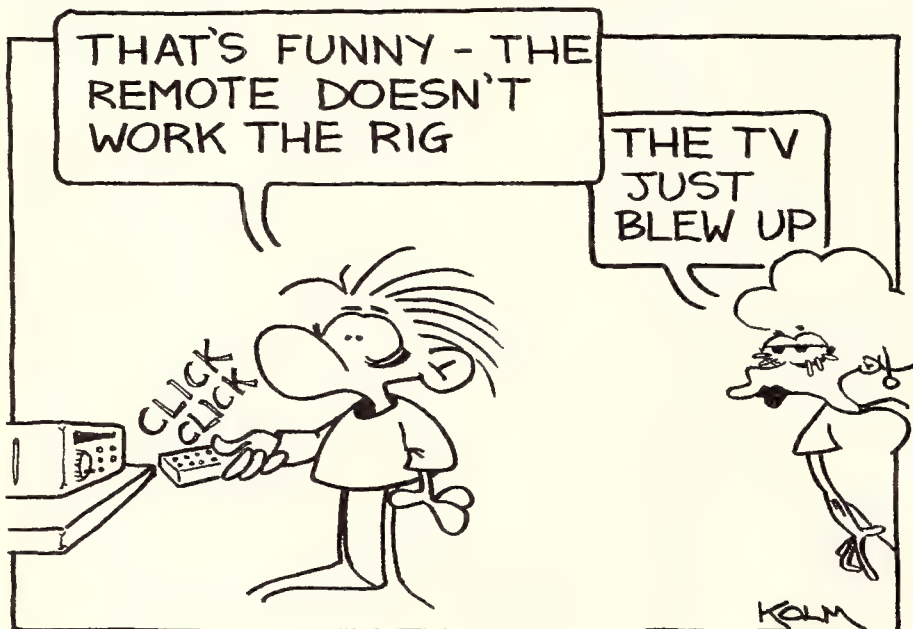
So that is about it for this issue, and many thanks to all those who enquired about my health during my recent 'foot episode'. The infection seems to have cleared up.

To the many who keep me informed, many thanks for the phone calls, faxes and letters. It is appreciated.

In particular, a special thanks is due to the various DX outlets:

**QRZ DX, Les Bacoires DX, Lynx DX Bulletin, Long Island DX Bulletin, JA 59 Magazine, JA DX News, RSGB DX Newsletter, DXpress, W6GO/K6HHD Managers List, Les Nouvelles DX and more.**

73 from Jim, VK9NS.





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Card number

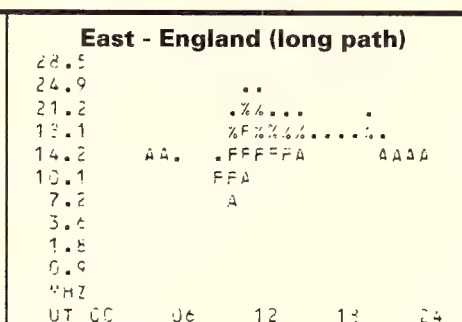
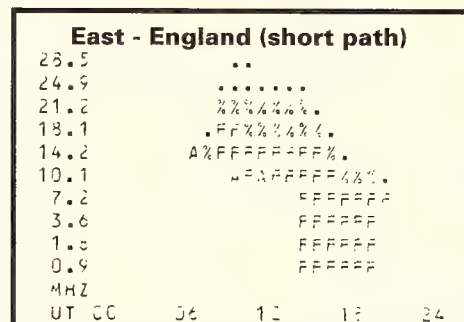
Expiry date \_\_\_\_ / \_\_\_\_ Signature \_\_\_\_\_

Rush your order to **ARA Shirt Offer, GPO Box 628E, Melbourne, Victoria 3001**





# Propagation



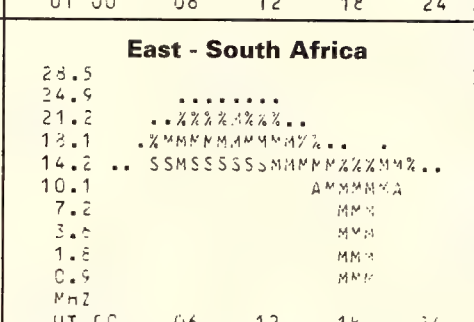
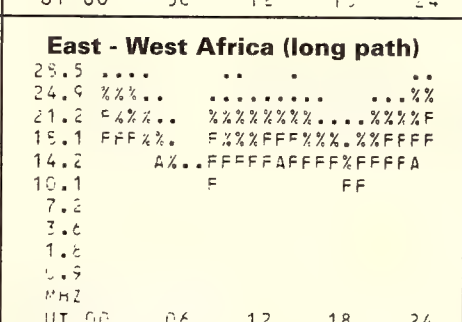
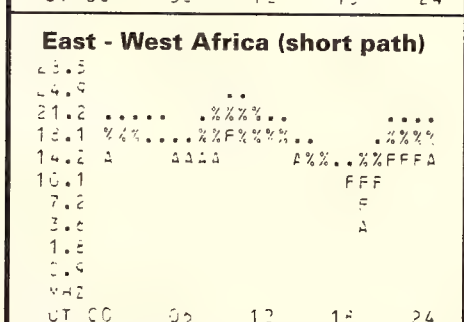
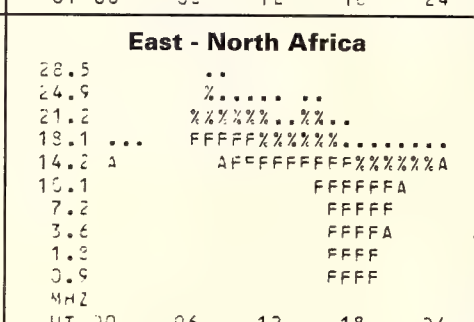
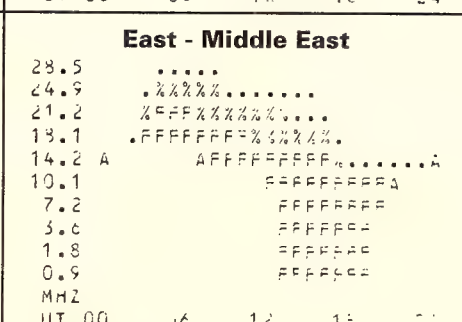
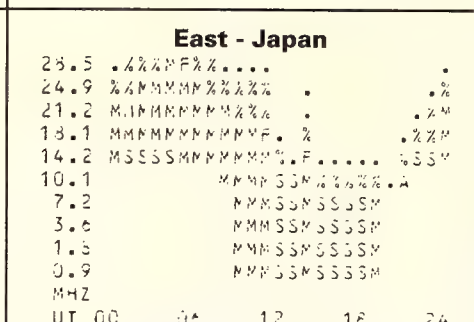
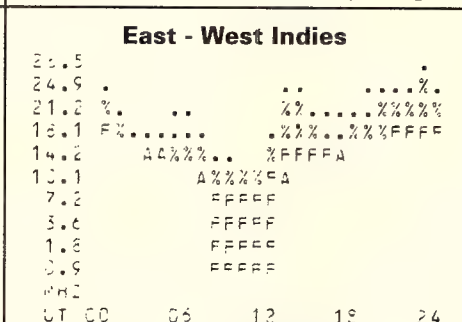
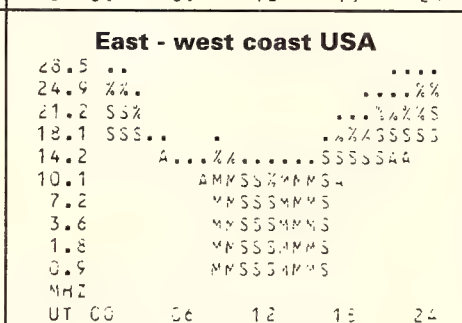
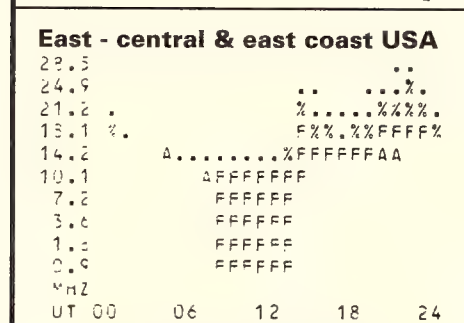
## ABOUT THESE CHARTS

The data on these pages are graphs showing forecasts for expected HF operating conditions between Australia and a number of important DX destinations. The information they contain is prepared by IPS Radio and Space Services, a division of the federal Department of Administrative Services. IPS monitors changing radio conditions — which are affected most greatly by fairly predictable changes in solar activity — and issues reports and warnings based on that data.

Stations in the eastern half of Australia should refer to the graphs on page 60. The data on page 61 is calculated for stations in the western half of the continent. Of course, if you're stuck right in the middle, try reading them *both* — then make an educated guess...

The horizontal axis of each graph represents the hour of the day expressed in Universal Co-ordinated Time, or UTC. The vertical axis lists specific points within each HF amateur band.

The maps are *easy* to read. First, go to the map which looks closest to the area you're interested in, look *up* from the time and *across* from the selected band to the point at which the two variables merge. Note which symbol — if any — appears at the intersection of the particular time and frequency combination for that area and refer to the legend at the right to find the sort of propagation most likely to apply. If the space is blank the forecast is *not* good — your time and frequency combination is unlikely to allow communication to the destination station.





LEGEND TO SYMBOLS		West - England (short path)					West - England (long path)				
■	Propagation is possible, but unlikely at this time and frequency on more than half the days of the month.	28.5	.....				28.5	.....			
%	This frequency / time pair should allow communications on between 50% and 90% of the month.	24.9	..% % % % ..				24.9	.....			
F	Your best bet — first 'F' mode conditions should apply on at least 90% of days this month for the given time and frequency.	21.2	% F F F F % % % %				21.2	..% % % % ..			
E	Propagation via the 'E Layer' expected on up to 90% of days of the month at this time and frequency.	18.1	F F F F F F % % %				18.1	% % % % % %			
P	A fair mixture: up to 90% chance of a path using 'F Mode' and between 50% and 90% probability of an 'E Layer' path.	14.2	..A F F F F F F F F %				14.2	% F F F F F A			
B	A good mixture: up to 90% chance of a path using either 'E Layer' or mixed 'F' modes.	10.1	F F F F F F F F F F				10.1	F F			
M	A mixture of combined 'F' modes — both first and second mode up to 90% of the time.	7.2	F F F F F F F F				7.2				
S	Second 'F' mode conditions should apply on at least 90% of days this month for the given time and frequency.	3.6	F F F F F F F F				3.6				
A	High atmospheric absorption of the signal is likely — better to use a higher band. Too close to ALF for good HF signals.	1.8	F F F F F F F F				1.8				
X	A complex mixture of modes is likely to apply, and could possibly include the second 'E' mode.	0.9	F F F F F F F F				0.9				
		MHZ					MHZ				
		UT 00 06 12 18 24					UT 00 06 12 18 24				
West - South America		West - central and east coast USA					West - west coast USA				
28.5	.....	28.5	.....				28.5	.....			
24.9	..% % % % ..	24.9	..% % % % ..				24.9	.....			
21.2	% F F F F % % % %	21.2	% % % % % % % %				21.2	% % % %			
18.1	F F F F F F F F A	18.1	% % % % % % % %				18.1	% F F F F			
14.2	..A F F F F F F F F	14.2	A F F F F F F F F F				14.2	A F F F F F F F F F			
10.1	F F F F F F F F F F	10.1	A F F F F F F F F F				10.1	F F F F F F F F F F			
7.2	F F F F F F F F	7.2	F F F F F F F F				7.2	F F F F F F F F			
3.6	F F F F F F F F	3.6	F F F F F F F F				3.6	F F F F F F F F			
1.8	F F F F F F F F	1.8	F F F F F F F F				1.8	F F F F F F F F			
0.9	F F F F F F F F	0.9	F F F F F F F F				0.9	F F F F F F F F			
MHZ		MHZ					MHZ				
UT 00 06 12 18 24		UT 00 06 12 18 24					UT 00 06 12 18 24				
West - West Indies		West - Japan					West - North Africa				
28.5	.....	28.5	..% % % % % %				28.5	.....			
24.9	..% % % % ..	24.9	% % % % % %				24.9	% % % % ..			
21.2	% F F F F % % % %	21.2	% % % % % %				21.2	% F F F F % % % %			
18.1	F F F F F F F F A	18.1	% % % % % %				18.1	F F F F F F F F % % % %			
14.2	..A F F F F F F F F	14.2	A F F F F F F F F F				14.2	% % % A A F F F F F F F F % % % %			
10.1	F F F F F F F F F F	10.1	A F F F F F F F F F				10.1	F F F F F F F F F F			
7.2	F F F F F F F F	7.2	F F F F F F F F				7.2	F F F F F F F F			
3.6	F F F F F F F F	3.6	F F F F F F F F				3.6	F F F F F F F F			
1.8	F F F F F F F F	1.8	F F F F F F F F				1.8	F F F F F F F F			
0.9	F F F F F F F F	0.9	F F F F F F F F				0.9	F F F F F F F F			
MHZ		MHZ					MHZ				
UT 00 06 12 18 24		UT 00 06 12 18 24					UT 00 06 12 18 24				
West - Central Europe		West - Middle East					West - South Africa				
28.5	.....	28.5	..% % % % % %				28.5	.....			
24.9	..% % % % ..	24.9	% % % % % %				24.9	.....			
21.2	% F F F F % % % %	21.2	% % % % % %								



You may fax your copy to (03) 670 9096 *on/v* if under 25 words.

PAV

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# ...CLASSIFIEDS... CLASSIFIEDS... CLASSIFIEDS...

## VK2 AREA

**Altron** 4-band mini-beam, covers 6, 10, 15, 20M. **Kenpro** HDD medium duty rotator. Both EC \$800 ono for both. Ross (018) 29 4510

**Chirnside** CA-333 band 3-el Yagi plus 40' hills tower, sell or swap. Bill, VK2CAI (02) 627 5303

**Codan** 4202 auto ATU 400W, suit boat backstay ant or long wire, EC \$450 ono. Graeme (02) 960 1365

**Eimac** tube 4CX1500Bs, both new & second hand.

**Kenwood** ATU-200 \$150. Change-over relay, open frame 110V. VK2DTR (02) 918 3835

**IBM** 120MB hard disk \$400. 386SX-33 motherboard \$160. Dave (018) 86 1768

**IBM**-compatible 80386-DX40 motherboard, 4MB RAM \$430 with warr upgrade to 486. David, VK2OJ (02) 809 0106

**Icom** IC-751A HF xcvr, great base rig, EC, mic, service & inst manuals \$1450. **Kenwood** TS-140S HF xcvr with MFJ945C ATU. Both as new, ideal mobile or base use. Les, VK2CLB (02) 997 1109. Licensed amateurs only.

**Kenwood** TM-231A 2M FM xcvr 5,10,50W does not go. Not electrically minded. A gift at \$150. Minor fault. With mic, manuals, orig packing etc. Brian, VK2MQ (069) 47 1213. Licensed amateurs only.

**Tower:** 50' heavy-duty tilt-over self-supporting. Ready to pick up. Also Telerelex tail-twister, HF/UHF Yagis, best offer. On behalf of Eddie, VK2KS, but call Horst, VK2HL (02) 971 9795

**Wanted:** info, software, manuals, Wang laptop computer 1986 model WLTC contains DOS-3.20 h/disk ext 5.25 floppy disc. Adam, VK2AUV (069) 48 8303 or write PO Box 20, Rosewood 2652

**Wanted:** Uniden workshop manual, photocopy fine.

## CAVEAT EMPTOR — BUYER BEWARE

*The acceptance of classified advertisements in the Amateur Radio Action classified advertising section does not warrant in any way that the goods offered are available, free of any encumbrance, in working order or otherwise satisfactory. The purchase of goods by private sale does not offer the purchaser any protection under law, and buyers should be certain the goods under consideration are suitable for the purpose for which they are required. Amateur Radio Action cannot accept any responsibility for goods advertised in the classified pages and no correspondence will be entered into regarding such goods.*

**The onus is on you...**

Brad, VK2KTP, (046) 21 2105, or write to PO Box 39N, Campbelltown North 2560

**Wanted:** Yaesu FT-712RH 70cm mobile, needed for BBS link freq. Must be EC, reas price paid. Les, VK2BBD (067) 69 6539

**Yaesu** FT-101ZD mkII HF xcvr, EC, 125W, as new with orig boxes & hbk, AM & FM boards, mod for FV-101DM ext VFO \$750 neg. Ian, VK2WR (02) 634 7210. Licensed amateurs only.

**Yaesu** FT-208R 2M HT with chrgr, manual & c/case, GC \$260 ono. Also Yaesu FT-101 HF xcvr with manual, GC \$360 ono. Mick, VK2MMA (066) 49 2372. Licensed amateurs only.

**Yaesu** FT-301 HF xcvr, 160-10M \$375. **Hidaka** multi-band HF vert ant \$90. **Standard** C520 twin-band HT \$675. All VGC. George, VK2NY (042) 34 2011. Transmitting gear sold to licensed amateurs only.

## VK3 AREA

**Alinco** DJ-F1T paging 2M HT. 138-174 MHz rx, DTMF, 40 mems, triple pwr levels to 5W, VOX, F/PTT lock, six scan

opts, 3 mths old, little used, 30 mths warr remaining, \$390. John, VK3TJB (059) 64 7520. Licensed amateurs only.

**Collins** 860E 1000MHz DME, h/bk \$125. **R390**/1 pwr cable & 9-pin \$10ea. David, VK3BFB (03) 587 1593

**Crystals** believed new, type HC-18.U 24MHz \$2ea. 18.225MHz \$1ea. Type HC-25U 468.450MHz \$1ea. Postage \$1.50. Neil, VK3QX (054) 28 3527 or write PO Box 217, Gisborne 3437

**Emtron** EDM-1 transistor dip meter 1.5-250MHz, 6 coils. Brand new, unused \$75, with manual, orig carton. Stewart, (057) 94 2851

**Exchange Galaxy V** trcvr for CR-100, B-40 R-5223, 9R-59DS or sim comms rcvr. John Wickham, VK3KGP 144 Danks St, Albert Park 3206. Licensed amateurs only.

**Hammarlund** 24hr clock, GC, suitable famous HQ series rcvrs \$45. **Sony** AN-101 active ant, new cond \$70. Keith (03) 570 7592

**Hy-Tech** RTTY/CW/SSTV cart program for Commodore C-64 comes with cables,

manual over 40 operating commands, HampackII modem, for C-64 tx & rx of RTTY/CW/ASCII \$200 lot. **VZ-200** computer Dick Smith data recorder for RTTY decoder for tx & rx \$120 the lot. Richard, VK3FRJ (03) 299 2991

**Icom** IC-22 2M xcvr in GC 10W o/p with manuals \$100.

**Alinco** DJ50OT dual-band FM HT, with two pwr packs, two chrgrs, spkr/mic, leather case, PC \$400. Jack, VK3EK (03) 386 2795. Licensed amateurs only.

**Icom** IC-R72 comms rcvr, 250kHz-29.9MHz \$750. Don, VK3TPC (03) 555 0684

**Kenwood** TS-530S HF xcvr, MC-355 mic, spare valves/driver, service/op manuals, plus AT-230 tuner, SP-230 spkr, Maldol HS-260 pwr/SWR meter, VHF/HF 12W/120W \$1100 the lot. All EC Paul, VK3EPD (059) 83 1771. Licensed amateurs only.

**Nally** tilt-over tower, \$650 or swap for Alinco dual-band xcvr. **Telex** machines \$40ea. Graham, VK3JBO (03) 464 2309

**Packet Radio system** comprising C-64 (slimline) 1541 disk drive, onboard VHF modem, green screen mon, manuals, lots amateur software, packet programs \$280. Damian, VK3EHP (053) 52 4183

**Shack cleanout:** BWD-506 CRO \$150, DSE 1GHz freq count \$150; Hewlett-Packard 608D sig gen \$250; Heathkit audio sig gen \$60; Heathkit signal tracer \$60; Kenwood TM-731A dual-band mobile \$825; Yaesu FT-727 dual band HT with batt packs, fast chrgr, spkr/mic \$375. Ross, VK3SR (03) 481 8482. Transmitting gear sold to licensed amateurs only.

**Wanted:** Alignment data for color camera Elmo Astron IP/EC-10. All costs paid. Stan, VK3SE (053) 32 2340

**Wanted:** Collins ARC-51X PA module, 12B4A. David, VK3BFB (03) 587 1593

## WEATHER FAX PROGRAMS

**RADFAX2** is a high resolution shortwave weather fax receiving, displaying & printing program for the IBM XT or AT computer with a CGA, EGA, VGA or Hercules card (please state which). Programs are \$35 each plus \$3 postage, & are supplied on 5.25" or 3.5" disk (please state which) plus full documentation. Programs are available only from: M. Delahunty, 42 Villiers St, New Farm Qld 4005. Ph. (07) 358 2785

Also **SATFAX** ver.5.0, (EGA & VGA) \$45, & **MAXISAT** (1024x768x16/256 SVGA) \$75 which are weather satellite picture receiving & displaying programs, add \$3 P&H.



# ... CLASSIFIEDS ... CLASSIFIEDS ... CLASSIFIEDS ...

**Wanted:** FM board for IC-740 part no. EX 242. Also inst manual for JIL SX-400. Photocopies okay. Bob Pate, VK3DEP, PO Box 678, Mildura 3502 or try (050) 25 7418

**Wanted:** Icom IC-211 2M all-mode or sim in GC, reas priced, Steven, VK3ZXR (054) 83 6197

**Wanted:** Icom IC-471 A or H. Ken, VK3WAL (051) 52 1506 B/H, (051) 52 3984 A/H

**Wanted:** Kenwood TS-940S HF xcvr. Must be in exc cond. Pay \$2500 for right rig. Ron, VK3OM (059) 44 3019

**Wanted:** Yaesu FT-101 B/E/EE only broken need for parts. Todor, VK3TNR (03) 391 6247

**Yaesu** FAS-1-4R remote ant selector to suit FC-757 ATU, brand new, unused \$150. Phil, VK3IN (059) 62 2832

**Yaesu** FTDX-570 HF xcvr c/w mic, manual, some spare valves, GC, capable of 400W PEP \$220. Stewart, VK3NV (059) 87 3592. Licensed amateurs only.

## VK4 AREA

**Codan** 6801 mkII HF marine SSB xcvr, two distress, three outback RFDS channels. With tuned mobile ant, manual ATU, workshop manual, fully operational \$1399 ono. John, VK1QBI/4 (074) 94 6747

**Icom** IC-R7000 25-2000MHz comms rcvr, mint cond, two yrs old with manual \$1150 ono. Rod (07) 821 0333 B/H, (07) 821 0345 fax.

**Kenwood** TS-120S HF xcvr & Kenwood AT-200 ATU. Both VGC \$700 ono, will consider freight. David, VK4NDC (070) 91 1344 B/H. Licensed amateurs only.

**Swap Atlas** 215x HF xcvr SSB-CW in good wkg ord for **Kenwood** AT-200 tuner with novice dummy load. Bob (07) 265 3621. Licensed amateurs only.

**Wanted:** Hidaka CE5B vert assembly insts with measurements much appreciated. Reg, VK4VRM (07) 284 6432

## RTTY/ASCII/Amtor/WX/CW/fax

Receive RTTY, Amtor, CW, WX & FAX with one software package. 'CDC32' features automatic Baud rate detection, automatic decoding, display & storage of aaxx/bbxx weather reports and a user-friendly menu developed by experienced licensed radio amateurs. You only need a IBM PC/XT or AT with a game port or RS232 serial port connected to a simple modem.

The complete program is \$85 plus \$3 postage, supplied on 5¼" or 3½" disk (please state which) plus documentation.

Available only from **Peter Nissen, VK2GFB**, 459 Liverpool Street, Darlinghurst NSW 2010. Phone (02) 361 5179

**Wanted:** Icom IC-R9000 comms rcvr. Rod (07) 821 0333 B/H, (07) 821 0345 fax.

**Wanted:** Info on interface for Alden weather fax recorder. Any help much appreciated. David, (076) 83 3268

**Yaesu** FC-707 ATU GC \$120. 10 FM xcvr GC \$65. 2m Iso-pole ant FC \$70. Buyer to collect. Paul, VK4APN (070) 53 6683. Transmitting gear sold to licensed amateurs only.

**Yaesu** FL-2100Z 1200W input linear, with WARC bands, 2-30MHz, two spare o/p tubes (TL-160/572B) \$1000 neg.

**Yaesu** FT-101E HF xcvr \$450. Peter, VK4APD (07) 397 3751. Licensed amateurs only.

**Yaesu** FT-290R mkII 2M all-mode xcvr, c/case, CTCSS board, 2AH batt, shack use only PC \$550. Paul, VK4ZDL (07) 208 5036. Licensed amateurs only.

## VK5 AREA

**Intelsat** international satellite (TVRO) rx system (movies, sport, news), solid comm 4.8M dish, plus system electronics package, can see operating. \$3995 ono. Rod (08) 387 0372

**Kenwood** TM-231A 2M FM xcvr with mic, cradle & digital voice unit, as new \$500 ono. John, VK5ARK (085) 86 6127. Licensed amateurs only.

**Kenwood** TS-930S HF xcvr, with Shure 444D mic, Bench-er key & MFJ keyer, all orig, incl books & boxes. \$2000 ono. Ron, VK5UW (08) 332 5068. Licensed amateurs only.

**Swap Werner Wulf** 5-el 2M Yagi for 2M Dingo ant. Mike, VK5RU (088) 67 1218

**Wanted:** Drake R4C comms rx, must be VG cond, pref no mods. Price etc to Bob, VK5MV (087) 25 1455

## SciSat Products

### Weather Satellite Receiver Kit

On the market for the last three years but, until now, only available to the few who have found out by other means — mainly through the efforts of Michael Delahunty — thank you Michael.

The receiver has been specifically designed to receive signals from polar-orbiting weather satellites. It has a proper tuned bandwidth of approximately 45 kHz and employs a continuous tuning method instead of the single frequency crystal method. Other features include a precision 2400 Hz pseudo-sine wave reference output and the ability to power the masthead pre-amp (also available) through the antenna lead.

For more information write to **Phil Webb, SciSat Products**, PO Box 307, Kenmore 4069. Phone (07) 372 1808

## VK6 AREA

**Kenwood** TS-830S HF xcvr, VGC, one owner \$1000 ono. **Icom** IC-701 HF xcvr plus IC-701 pwr supp \$600 ono. Ceramic core roller inductor plus 2 air spaced variable capacitors. Suit HDATU. Neil, VK6IA (09) 527 1068. Transmitting gear sold to licensed amateurs only.

**MFJ** 16010 ATU, brand new \$60 plus post. Jeff (09) 277 3803

**Wanted:** 2M xcvr. Neil, VK6IA (09) 527 1068

**Yaesu** FT-101ZD HF xcvr, mint cond, comp with manual, WARC bands, fan & YD-148 mic. Offers? Gordon, VK1GO/6 (090) 91 2982. Licensed amateurs only.

**Yaesu** FT-747 HF xcvr \$900 GC. **Icom** IC-751A HF xcvr EC \$1750. Yaesu FRT-7700 ant turner for SW \$80. Want to update. Darrell, VK6KDC (097) 71 2498. Transmitting gear sold to licensed amateurs only.

## VK7 AREA

**Yaesu** FT-747GX HF xcvr plus MD-1B8 desk mic, all GC, will swap for Icom R-71A comms rcvr or sim. Steve (004) 58 1424

## VK8 AREA

**Icom** SM-10 compressor graphic equaliser desk-top mic, still in box \$150 ono or swap for SM-8. Charlie, VK8PC (089) 85 218

**If you are advertising items for sale please do NOT quote a PO Box number without also quoting your full residential address in the body of the advertisement. This is the LAW.**



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## QSL CARDS

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Heard the SSTV on 14.230MHz and wished you could *see* it? Build this low-priced receive scanconverter and decode both B&W and color pictures. Displays them as a high-resolution picture on a standard TV with video input.

**Kit 1** PCB and documentation \$80 incl post.

**Kit 2** PCB, documentation and all components (excluding case) \$200 incl post.

Send cheque or SASE for more info to LM Williams, 14 Powell Street, Bungendore, NSW 2621

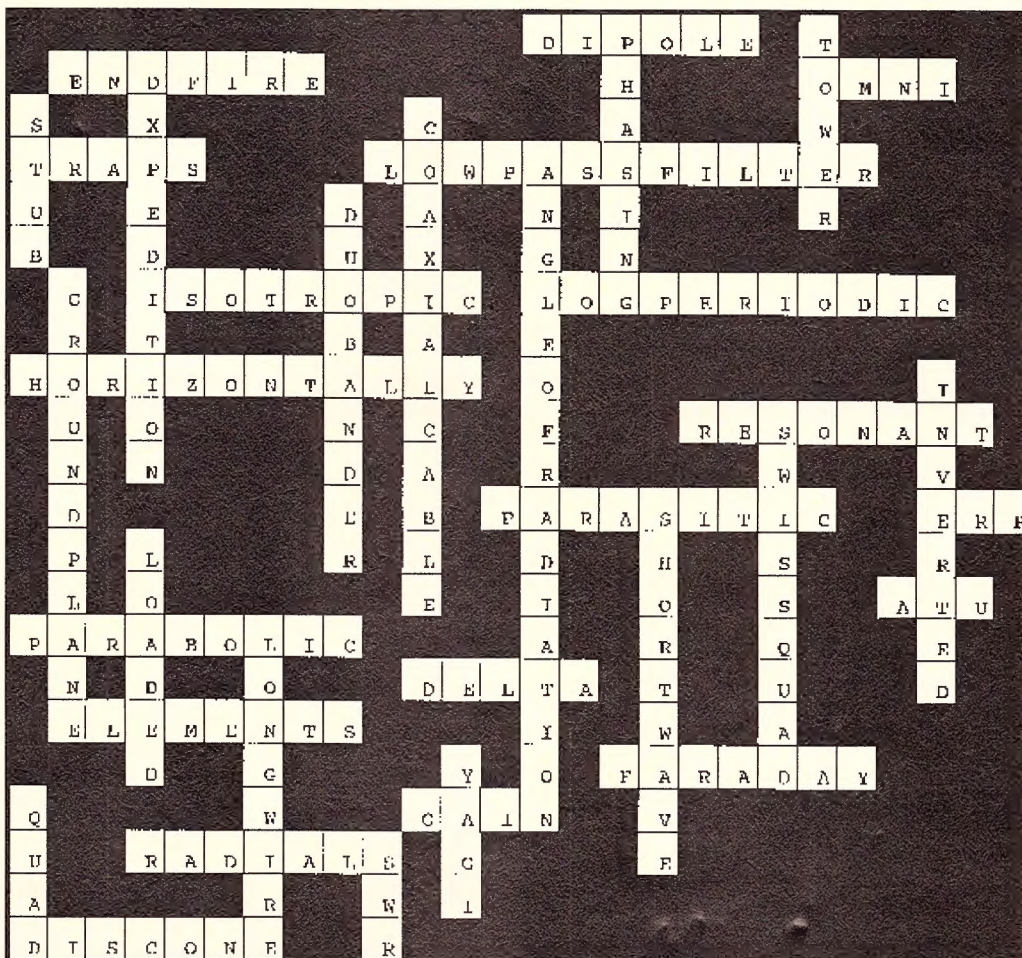
## SHORTWAVE LISTENERS' HELPERS

**Receivers & Long Wave Guide**, two new publications, \$2.50 each, incl P&P, from **Southern Cross DX Club**, GPO Box 1487, Adelaide, SA 5001.

Please allow one month for delivery.

**ANSWERS**  
to the "So  
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You Know It  
All"  
crossword  
on page 19.

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# MFJ SWR & Power meters



## HF & VHF SWR Analysers

The MFJ207 and MFJ208 are rapidly becoming two of the most sought after pieces of amateur equipment around. In the short time since their release they have propelled themselves forcibly onto the best seller list and look like staying there! Designed for the ultimate in convenience when tuning antennas, checking amplifiers and installing feed lines the **SWR analysers** have a low level R.F. source, an SWR bridge and a **fully automatic** SWR calculating circuit that offers point and shoot convenience with excellent accuracy.

The MFJ207 covers 1.8-30MHz in 5 bands while the MFJ208 covers 136-150MHz in a single band. Both units can use an internal 9V battery (not supplied) or an external 9-18V DC source. An output is provided for connecting a frequency counter to permit accurate readings when checking narrow band antennas. Vernier drives are fitted to the tuning controls for ease of use.

Ideal for use up the tower when installing antennas, you don't need to have someone else in the shack to check the SWR while you work. Nor do you have to expose yourself to high level RF fields in the process.

MFJ207 \$219 MFJ208 \$197.89

### Noise Bridge

The MFJ202B has long been respected as one of the world's finest noise bridges. Boasting a hand calibrated resistance scale and an extended capacitance range of  $\pm 150\text{pf}$  and built-in range extender the MFJ202B covers the range from 1 to 100MHz with ease!

You can quickly adjust single and multi-band antennas of all types for best performance. Determine the resonant frequency of the antenna and whether it needs to be lengthened or shortened for the best SWR over a whole band or just a portion of a band. Works with any receiver or transceiver. Case size 108 x 108 x 50mm, uses 9V battery (not supplied)



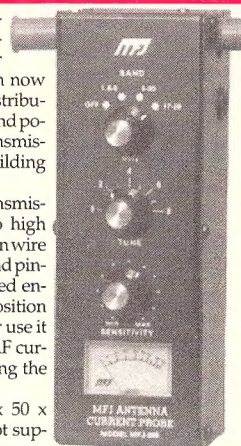
MFJ202B 1-100MHz noise bridge \$162

### Antenna Current Probe

The MFJ206 is designed to measure RF current without the need for direct connection. You can now determine the current distribution, RF radiation pattern and polarisation of antennas, transmission lines, guy wires, building cabling and enclosures.

You can check for transmission line radiation due to high SWR or poor balance of open wire lines. Detect re-radiation and pinpoint RF leakage in shielded enclosures, locate the best position for your mobile antenna or use it as a field strength meter. RF current is monitored by sensing the magnetic field it creates.

Measures only 100 x 50 x 50mm, uses 9V battery (not supplied) or external DC source.



MFJ206 Antenna current probe \$173

## Now with digital frequency readout



When the MFJ207 was first introduced to the Australian market Ron Fitts commented in his review that it would be nice if it had a built-in frequency counter for accurately setting and reading the frequency. We listened! Now MFJ has added a complete 150MHz counter into the SWR analyser. Use it as a digital display for the internal signal source or as a frequency counter with .01, .1, 1 & second gate times giving you 0.1Hz resolution!

The easiest way ever to measure SWR from 1.75 to 30MHz!

MFJ247 HF SWR analyser w counter \$409.

### Hand-held power & SWR meters

#### MFJ840

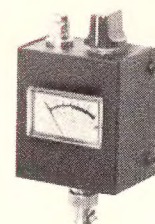
Reads the output power of two metre hand held transceivers. Full scale with 50W BNC connector. 50 x 50 x 40mm

MFJ840 \$43

#### MFJ841

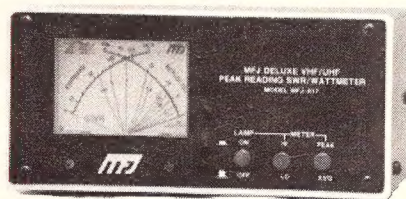
Connects directly line to measure power & SWR of 2 metre handhelds. Read SWR from 1.6:1 and power up to 100 watts. 50W BNC connectors, 50 x 57 x 40mm.

MFJ841 \$87



### Crossed needle SWR/Wattmeters

Don't risk your expensive 144 or 440 MHz rig by transmitting without knowing your SWR! Weather, age or a slight bend in your antenna can send your SWR to dangerous levels. Let the MFJ-817 UHF/VHF Cross-Needle SWR/Wattmeter show you peak or average forward and reflected power — all at a glance on power ranges of, 200/20 watts forward and 5/50 watts reflected. A glance at your MFJ-817 instantly shows you SWR from 1:1 to 8:1. No more risky guessing. Meter lamp and a large, two-color meter make reading easy. Black aluminium cabinet measures 184 x 114 x 90mm. Lamp uses 12 VDC (supplied externally)



MFJ817 2m/70cm SWR/Wattmeter \$176

The MFJ-815B has a new peak and average reading function! Let it you monitor SWR, forward and reflected power — all at a single glance! Read peak or average forward and reflected power in 2 ranges (200/2000 watts forward and 50/500 watts reflected) and SWR from 1:1 to 8:1. Covers 1.8 to 30 MHz. Accuracy is  $\pm 10\%$  of full scale. Mechanical zero adjustment for meter movement. Easy push button selection of range, meter lamp and peak or average functions. The attractive black aluminium cabinet measures 184 x 114 x 90mm. SO-239 connectors. Meter lamp uses 12 VDC.



MFJ815B 1.8-30MHz SWR/Wattmeter \$151

### VHF & HF SWR & Wattmeters



The MFJ812B is the world's most popular & affordable VHF SWR & Wattmeter. Covering the 2mtr amateur band this handy unit reads forward and reflected power in two ranges (30 or 300 watts) and also lets you read relative field strength from 1-170MHz or SWR from 20 metres through 2 metres.

MFJ812B \$65



MFJ816 HF SWR wattmeter lets you read forward and reflected power on two scales of 300W and 3000W from 1.8 to 30MHz. Constructed in sturdy aluminium case finished in black with eggshell white panel. Easy to read two colour meter scale, case size 114 x 57 x 75mm.

MFJ816 \$6

# Stewart Electronic Components Pty. Ltd.

44 Stafford Street Huntingdale : PO Box 281 Oakleigh 3166

ACN 004 518 898

Phone (03)543-373

BankCard, Visa, MasterCard welcome

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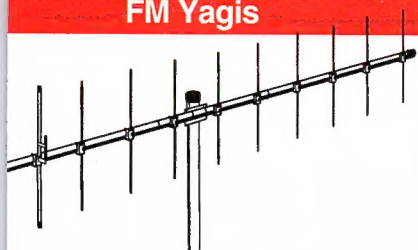


## FM Yagis

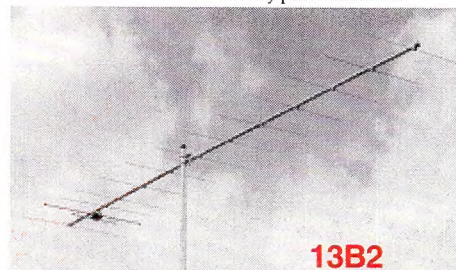
## Boomer FM, SSB & CW Yagis

# VHF & UHF Vertical and beam antennas

## Ringo verticals



The Cushcraft Boomer range represents the state of the art in VHF and UHF Yagis for most uses. Supplied complete with all necessary mounting hardware. The 26B2 is a combination of two 13B2's and a cross boom for vertically polarised FM use.



13B2

Model	617-6B	124WB	13B2	17B2	26B2	424B
Frequency, MHz	50.51	144.148	144.148	144.145	144.148	430-435
Number of elements	6	4	13	17	26 (Vert)	24
Forward gain, dBd	14	10.2	15.8	18	18.8	18.2
Front to back ratio, dB	30	24	26	26	26	30
Power, watts PEP	2000	2000	2000	2000	2000	2000
Boom length, metres	10.36	1.22	4.57	9.45	4.57	5.3
Longest element, mtrs	2.97	1.04	1.02	1.04	1.02	.34
Turning radius, mtrs	5.39	1.22	2.7	5.26	3.18	3.05
Max mast size, mm	50	50	50	50	50	50
Wind load, square mtr	.45	.034	.17	.36	.17	.21
Weight, kg	11.83	1.36	3.1	7.19	3.05	2.05
Price (inc tax)	\$731	\$126	\$253	\$429	\$702	\$283

VHF FM communications is still the major growth area of our radio today. Both for voice and for packet operation, Cushcraft's FM Yagis and Boomer FM Yagis are ideal choices no matter what type of operation you are interested in. High gain, radiation patterns, ease of assembly and materials of the highest quality are all part of the story.

Multi-antenna arrays are also part of the story. As are stacking frames and power splitters for virtually the entire range. Ask for the Cushcraft stacking data sheet for precise details and prices.

Model	A147-11	A147-22
Frequency, MHz	145.5-148	145.5-148
Number of elements	11	22
Forward gain, dBd	13.2	16.2
Front to back ratio, dB	20	20
Power, watts PEP	800	800
Boom length, metres	3.6	2.1x3.6
Longest element, mtrs	1.02	1.02
Turning radius, mtrs	1.8	2.0
Max mast size, mm	39	39
Wind load, square mtr	.11	.26
Weight, kg	2.73	6.83
Price (inc tax)	\$166	\$458

## Oscar

Here's the system to get you going for amateur satellite operation. The Cushcraft AOP-1 'Oscar Pack' includes the 416TB 2m uplink, the A144-20T for 2m downlink, a mounting and all the hardware necessary for quick installation. OSCAR operation will be more fun with the optional remote station switch, PS4, mounted right on the 416TB. You will have access to satellites having either right or left polarisation.

## AOP-1

\$489



Model	A144-10T	A144-20T	416TB
Frequency, MHz	145.9	145.9	435
Number of elements	2x5	2x10	2x8
Forward gain, dBd	10.5	12.2	12.5
Front to back ratio, dB	20	20	20
Power, watts PEP	800	800	800
Boom length, metres	1.8	3.3	2.03
Longest element, mtrs	1.02	1.02	.34
Turning radius, mtrs	1.04	1.78	2.04
Max mast size, mm	39	39	50
Wind load, square mtr	.07	.13	.05
Weight, kg	1.59	3	2.23
Price (inc tax)	\$185	\$263	\$214

## BLITZ BUG LIGHTNING ARRESTORS

The Cushcraft Blitz Bug arrestors use a patented three static discharge cell design. They have a sealed chamber, constant drain and controlled arcing. Blitz bugs are rated at 500MHz with negligible ion loss.

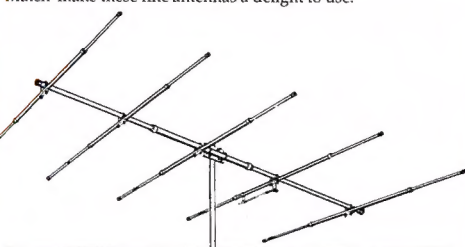
LAC-1



LAC-2

C1 with UHF plug & UHF socket  
C2 with UHF sockets

\$16.56  
\$20.52



## Sideband Yagis

The performance of these budget antennas will surprise you! They are light weight, durable and easy enough to assemble that you will be on air in an afternoon. Good bandwidth, tapered elements and direct 50Ω matching with the Cushcraft 'Reddi-Match' make these fine antennas a delight to use.

Model	A50-3	A50-5S	A50-6S	A144-7	A144-11	A430-11
Frequency, MHz	50-54	50-54	50-54	144-145	144-146	430-435
Number of elements	3	5	6	7	11	11
Forward gain, dBd	8	10.5	11.2	11.1	13.2	13.2
Front to back ratio, dB	20	22	24	20	20	20
Power, watts PEP	1000	1000	1000	1000	1000	1000
Boom length, metres	1.8	3.7	6.1	2.5	3.7	1.4
Longest element, mtrs	3.0	3.0	3.0	1.00	1.0	.35
Turning radius, mtrs	1.8	2.3	3.4	1.5	2.0	.81
Max mast size, mm	50	50	50	39	39	39
Wind load, square mtr	.17	.25	.41	.08	.11	.04
Weight, kg	3.19	5	8.2	1.82	2.73	1.4
Price (inc tax)	\$221	\$365	\$444	\$92	\$159	\$115

## Lightning arresters

### Gas Discharge lightning arresters

Protect your valuable equipment from lightning induced surges of up to 5000 amperes with a Cushcraft constant impedance gas discharge lightning arrester! The LAC4 series have replaceable gas tubes which clamp surges to about 50V in about 100 nanoseconds, much quicker than the voltage rise time of lightning pulses.



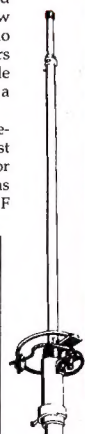
LAC4 200 watt with UHF connectors	\$70.80
LAC4H 2kW with UHF connectors	\$75.00
LAC4N 200 watt with N connectors	\$82.00
LAC4NH 2kW with N connectors	\$89.00
LC2 200 watt replacement cartridge	\$28.62
LC2KW 2kW replacement cartridge	\$32.52

## 10, 6, 2 metres & 70cm

If you need a combination of compact size and low weight in a vertical antenna that also offers low radiation angle and wide bandwidth then look no further! The Cushcraft Ringo antenna family offers unequalled variety with high quality and affordable prices. In fact a genuine Ringo is so good it makes a 'Dingo' look like a real dog!

The basic Ringo family are 1/2 wavelength designs which have the antenna connected to the mast for DC and so have inbuilt lightning protection. Nor do they build up static charge like many other designs to interfere with your enjoyment of the amateur VHF and UHF bands.

Model	AR-10	AR-6	AR-2	AR-45
Frequency, MHz	28-29.7	50-54	135-160	430-460
SWR 2:1 Bandwidth, MHz	>1.5	2	10	20
Gain, dB	3.75	3.75	3.75	3.75
Power, watts FM	1000	1000	1000	500
Radiation angle	16°	16°	16°	16°
Height, metres	5.36	3.1	1.2	.43
Max mast size, mm	32	32	32	22
Wind load, square mtr	.16	.03	.02	.01
Weight, kg	1.82	1.14	.68	.46
Price (inc tax)	\$128	\$121	\$83	\$88



Model	ARX-2
Frequency, MHz	135-160
SWR 2:1 Bandwidth, MHz	>6
Gain, dB	4.5
Power, watts FM	1000
Height, metres	2.8
Max mast size, mm	32
Wind load, square mtr	.03
Weight, kg	1.62
Price (inc tax)	\$99

## RINGO RANGER

For that bit of extra gain where space does not permit the installation of decoupling radials for an antenna such as the ARX2B then the ARX2 is for you.

## RINGO RANGER II

Cushcraft's Ringo Ranger II has more gain, less windload and greater mechanical integrity than other two metre antennas. You will readily appreciate the benefits of this amazing antenna! The Ringo Ranger II has built-in lightning protection, UV stabilised insulators, heavy duty heavy wall tubing, improved decoupling radials to prevent feed line radiation and all weather performance only available in antennas costing many times more. It's the performer, over 500,000 have been sold world wide!

Model	ARX2B	ARX450B
Frequency, MHz	135-160	435-450
SWR 2:1 Bandwidth, MHz	>3	>10
Gain, dB	7	7
Power, watts FM	1000	1000
Radiation angle	7°	7°
Height, metres	4.3	1.5
Max mast size, mm	32	32
Wind load, square mtr	.05	.02
Weight, kg	2.73	.5
Price (inc tax)	\$118	\$114

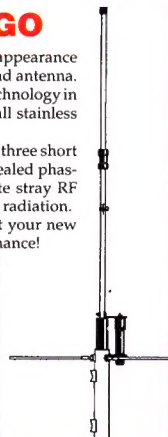
## DUAL BAND RINGO

Experience the performance and appearance advantages of an all aluminium dual band antenna. The AR270 incorporates Ringo Ranger technology in a lightweight and durable design with all stainless steel hardware.

Its two section vertical element and three short radials is easy to install anywhere. The sealed phasing coil and matching network eliminate stray RF currents while providing a low angle of radiation.

A single coax is all you need to get your new dual band rig working to its full performance!

Model	AR270
Frequency, MHz	144-148 435-450
SWR 2:1 Bandwidth, MHz	>4 >15
Gain, dB	3.7 5.5
Power, watts FM	250 250
Height, metres	1.13
Max mast size, mm	.03
Wind load, square mtr	.03
Weight, kg	.91
Price (inc tax)	\$145



# Stewart Electronic Components

4 Stafford Street Huntingdale : PO Box 281 Oakleigh 3166  
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